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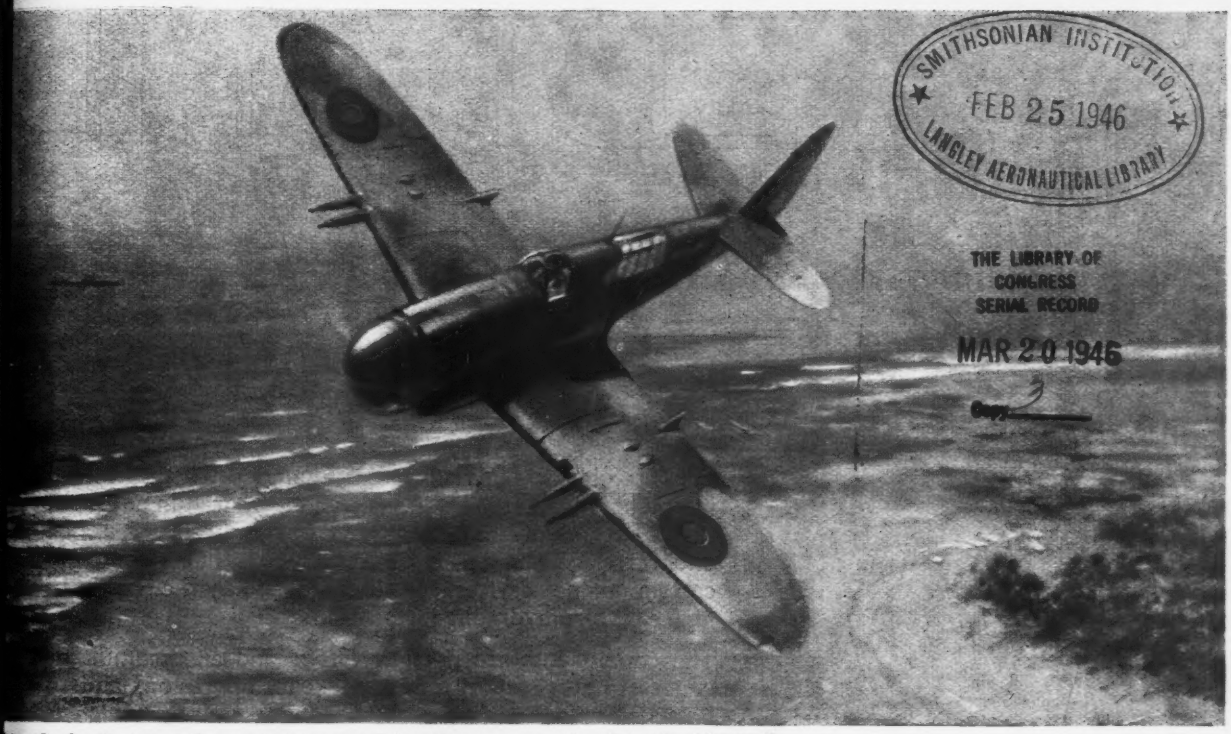

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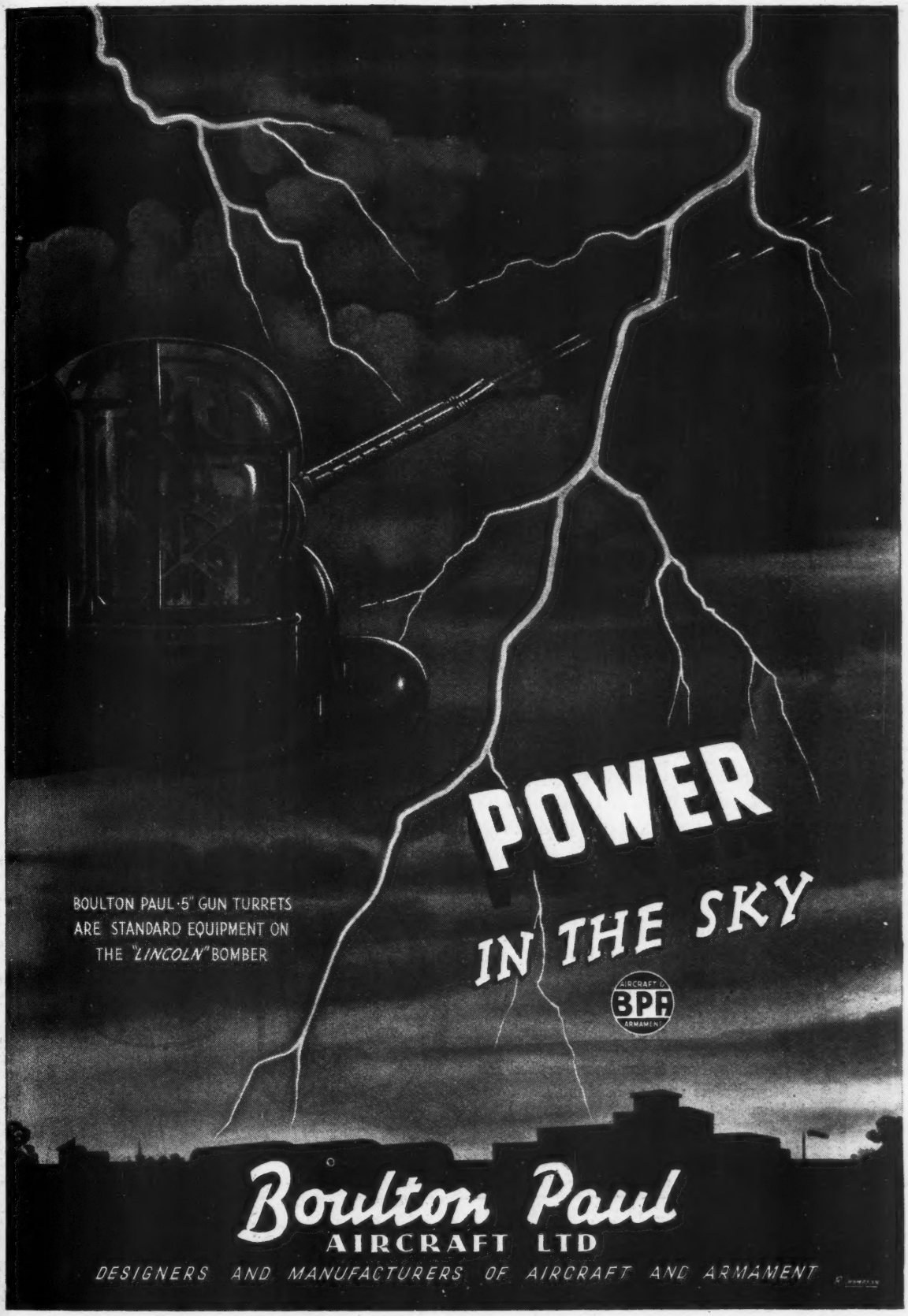
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the less I earn,
For the soles ne'er crack,
nor the uppers turn,
The better my work,
the less my pay,
But work can only be
done . . . . o-o-one . . . .
wa-a-a-a-a-ay!

THE honourable poverty to which you refer—said the odious youth Tin Lung—shows clearly in your mean garments and the depressing flatness of your honourable stomach. But why then, Magnificence, continued the youth, do you make these announcements at your own expense in the public news sheets, since they can only bring you additional work and so increased poverty?

Pure benevolence, O Asker of Awkward Questions, Pure benevolence—replied His Magnificence with an acid smile.

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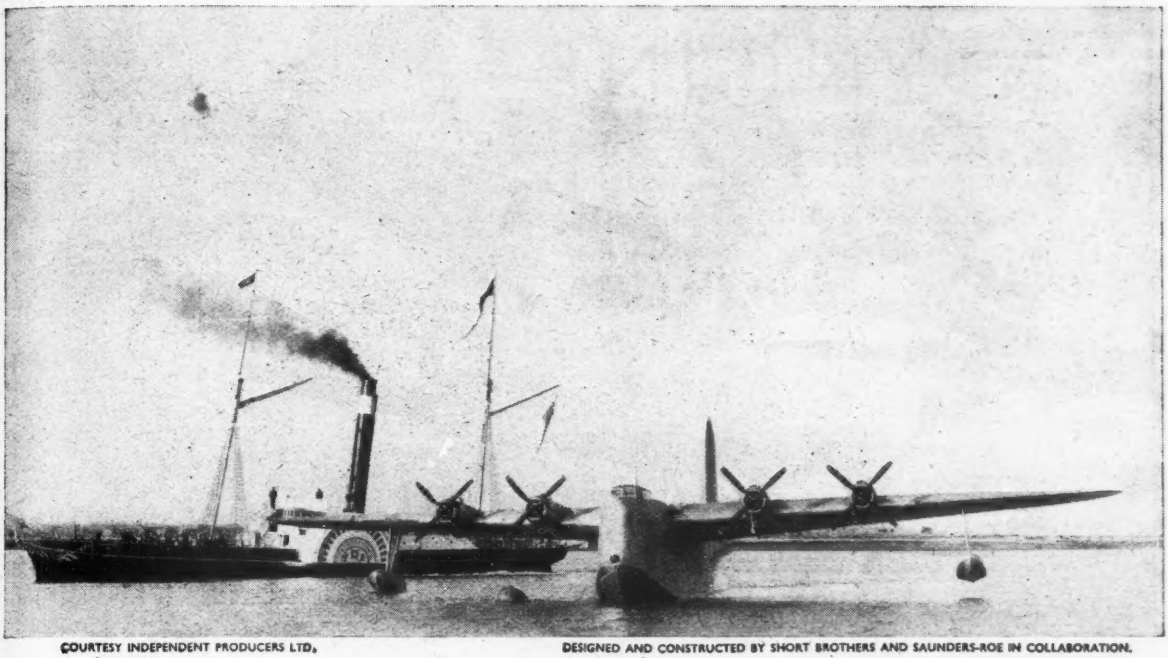

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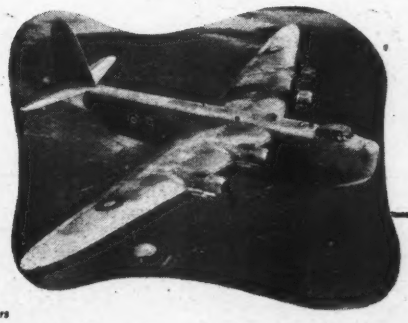

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FLIGHT Jan. 25 1946 Advert.

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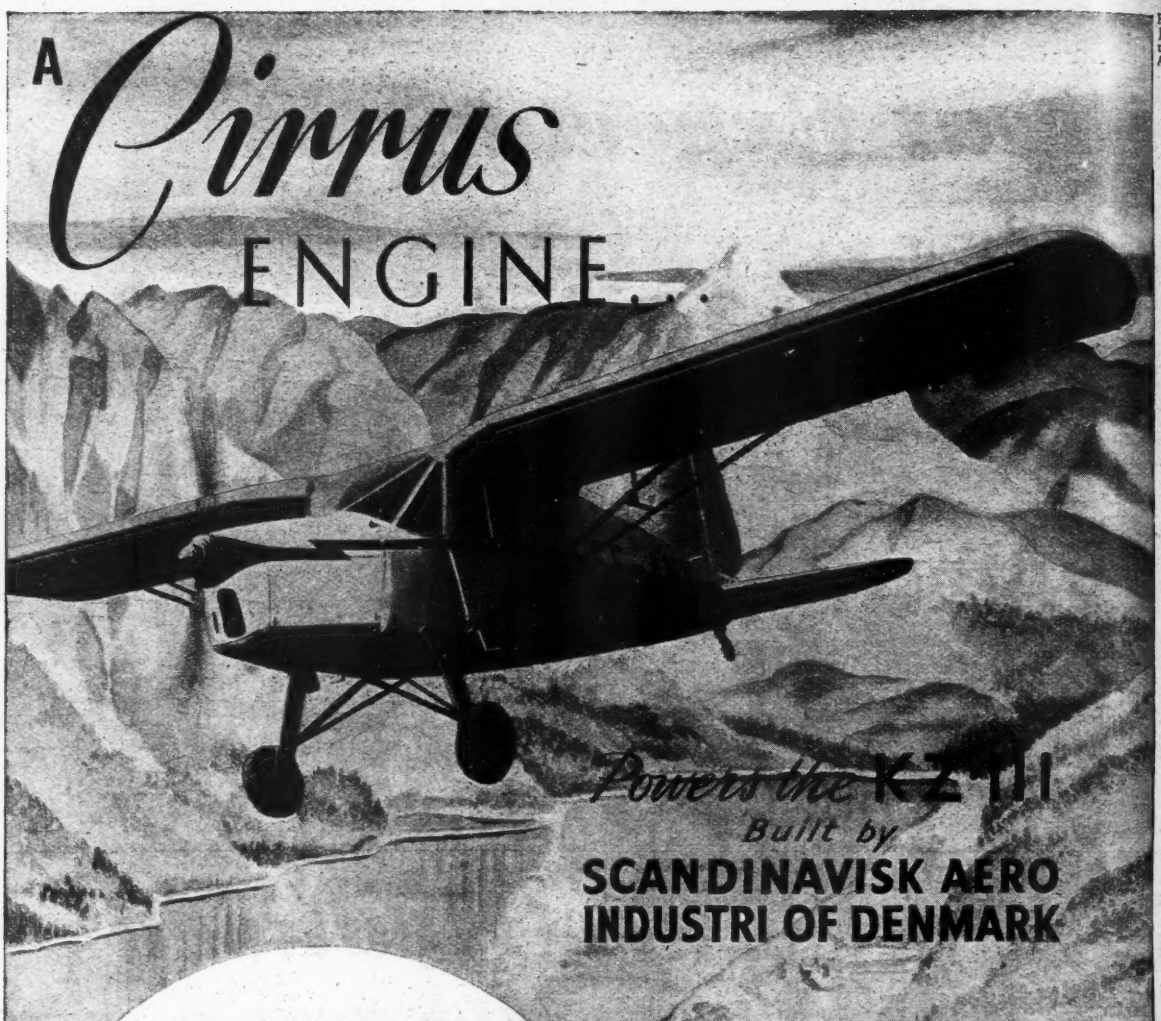

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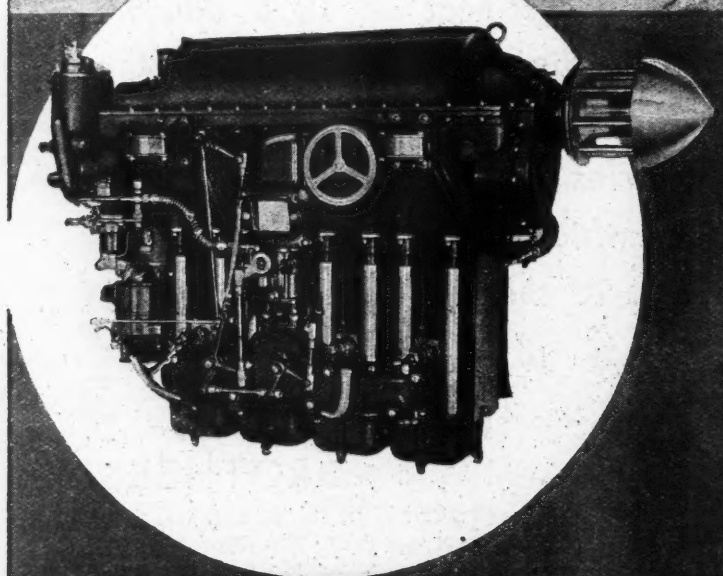

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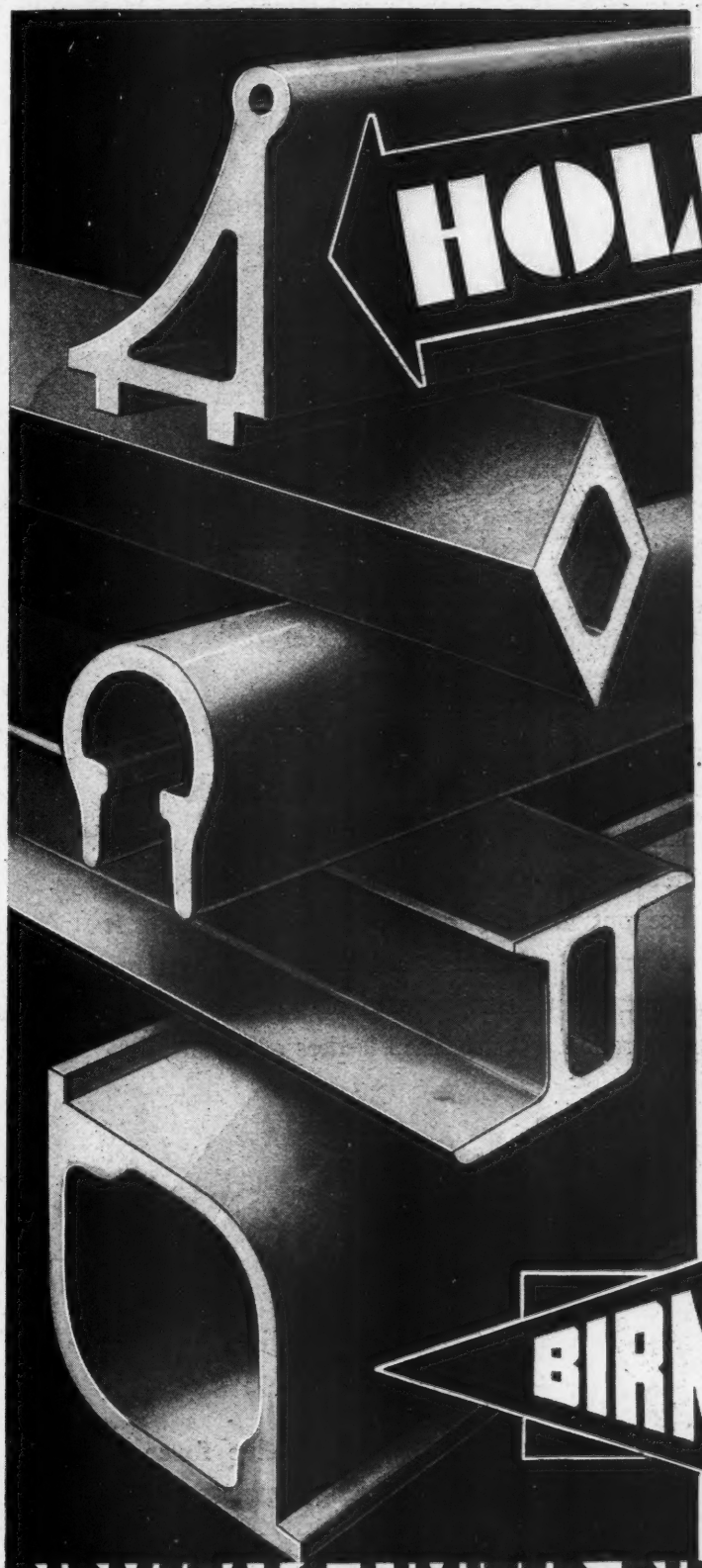

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LATITUDE :—	27·30 N.
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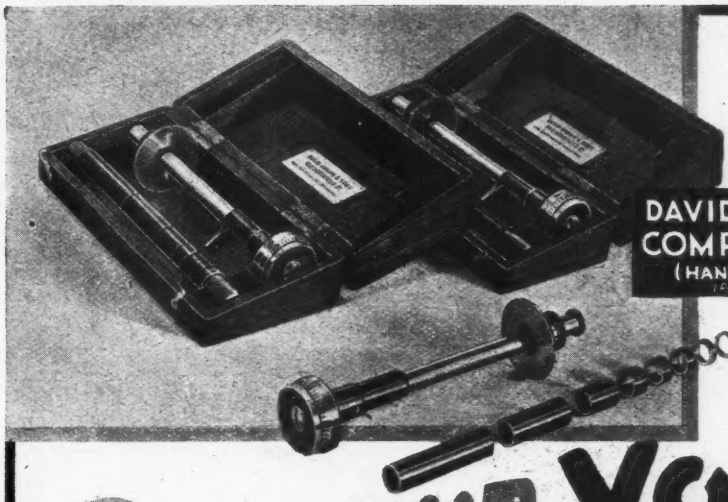

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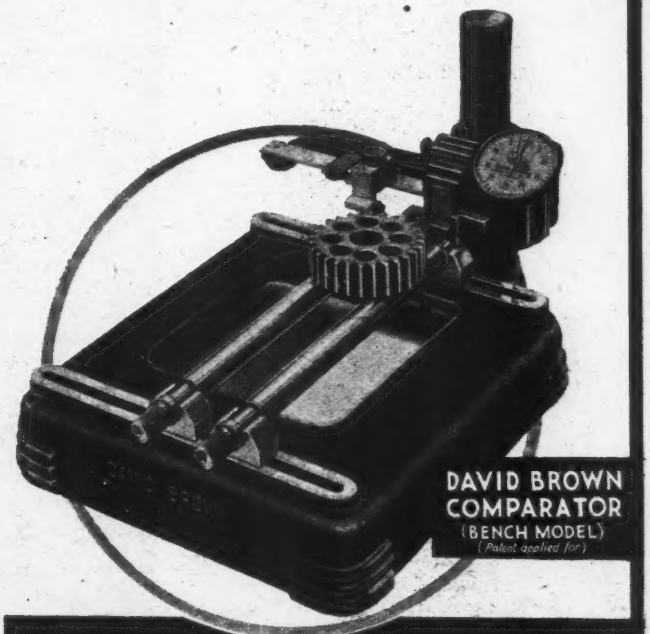

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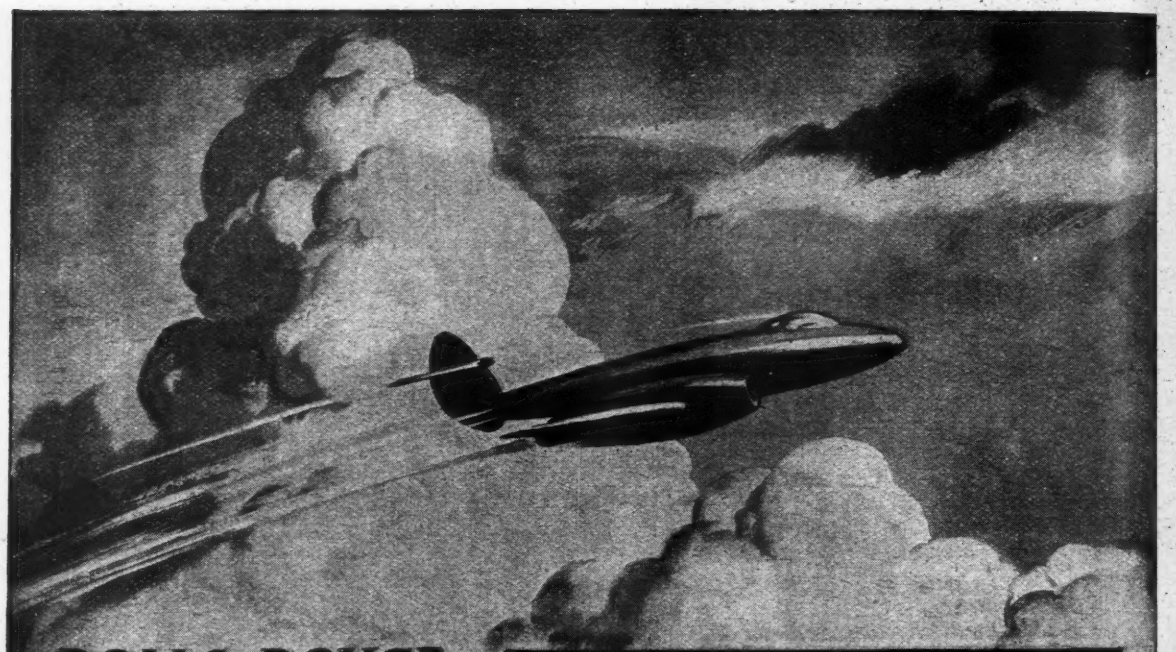

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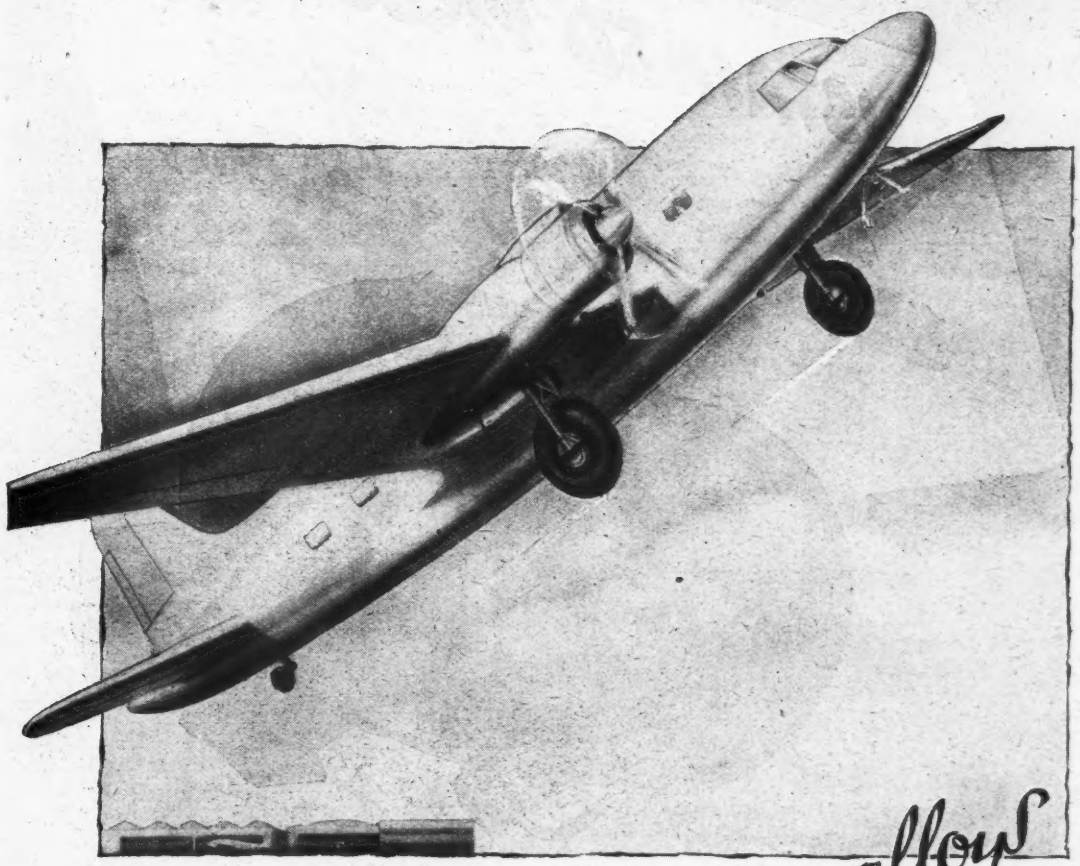

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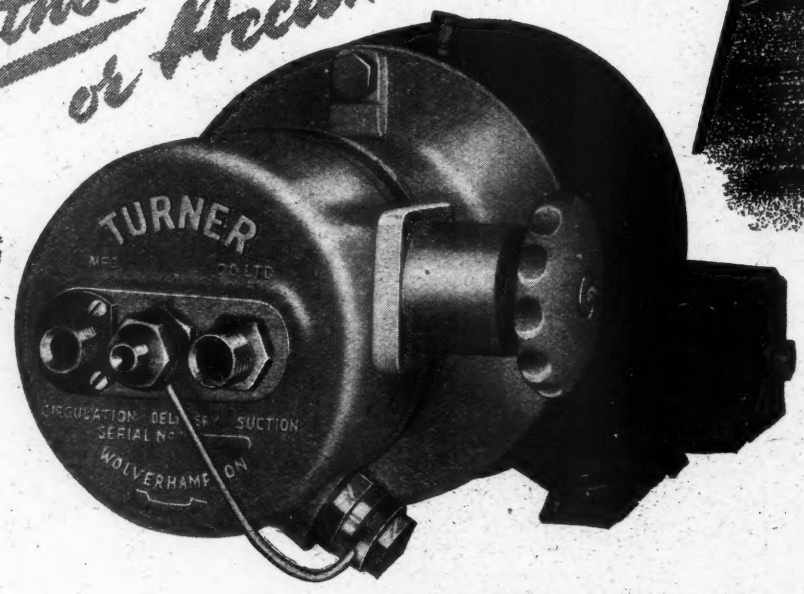

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (35 lines).

COVENTRY: 8-10, CORPORATION ST. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.
BIRMINGHAM, 2: GUILDHALL BUILDINGS, NAVIGATION ST. Telegrams: Autopress, Birmingham. Telephone: Midland 2971 (5 lines).
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GLASGOW, C.2: 26B, RENFIELD ST. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

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Registered at the G.P.O. as a Newspaper.

No. 1935. Vol. XLIX. January 24, 1946 Thursdays, One Shilling.

The Outlook

Things Are Moving

RECENT events have done a good deal towards putting Great Britain back on the aeronautical map. The uncertainties caused by changes in Government civil aviation policy are sorting themselves out slowly. The debate on the Winster White Paper, which begins in the House to-day, should help further to elucidate the position. The Government is committed, irrevocably it would seem, to nationalisation of air transport, but within that framework a good deal of latitude may be found to exist.

In the meantime, we ought to be thankful that everything has not come to a standstill in the manner that was once expected. Two really magnificent flights have served as an augury of what may be expected when this country finally gets started in earnest. Air Vice-Marshal Bennett and his companions have visited Rio de Janeiro, Montevideo and Buenos Aires, calling at Lisbon, Bathurst and Natal on their way in the Lancastrian *Star Light*. The significance lies not merely in the series of "proving" flights, of which this was the first, but also in the fact that British South American Airways have been permitted to make them. From this it may be assumed that the Government has found some way of bringing this firm, founded by shipping interests, into the proposed set-up of corporations. The actual position will probably be made a little clearer during to-day's debate.

Of a very different nature, but equally valuable from the point of showing the flag, was the record-breaking flight by Air Commodore D'Aeth and his crew in the Lancaster *Aries*, in which, with one stop at Cairo, they covered the distance between Thorney Island and Cape Town in 32 hours 21 minutes' lapsed time, or seven hours 4 minutes better than the record set up by Alex. Henshaw on a Percival Mew Gull in 1939.

That a converted four-engined bomber with a crew of nine should be able to improve so considerably upon a record established in a single-seat racing monoplane is an indication of the progress made in the last seven years, and from the fact that both these flights were made in Avro machines one is justified in expecting great things from the Tudors, designed specifically for commercial flying.

Of the third recent flight, which may have been completed by the time this issue reaches our readers, it is more difficult to be enthusiastic. We are all in favour of delivering aircraft by air as a normal procedure. There is something rather undignified in shipping them, crated, by the slowest of all forms of transport, and a good deal of time is wasted thereby. But to deliver a single-engined aircraft by air across nearly 2,000 miles of South Atlantic does not appeal to us as good business. That was all very well in the days when it was necessary to demonstrate to the world that British aircraft could make such non-stop flights, and even then we always regarded it as a foolhardy business to trust to a single-engine installation, no matter how reliable the engine itself might be.

Nowadays there is no need to take avoidable risks in order to provide a proof which has already been amply established. For overland routes on which there is a good chance of making a forced landing, it is a very different matter.

General Critchley's Resignation

THE announcement that General Critchley has resigned his appointment as Director-General of B.O.A.C. will not have come as much of a surprise to the British aviation world. It was almost a foregone conclusion that this would happen sooner or later. Time after time pressure has been brought to bear in Parliament and elsewhere, and in view of his known belief that a single organisation should run all British overseas air lines it was to be expected that, with the declared Government policy of two or more

corporations for operating external services, he would be in strong disagreement.

We have never made a secret of our own views in the matter, and it would be idle to pretend that we feel that General Critchley's departure spells ruin to the B.O.A.C. We are, however, greatly intrigued by his claim that during his three years of office the financial affairs of the Corporation have changed from a deficit of £2,300,000 to a surplus of £1,500,000. If those figures mean what they seem to mean, critics have done General Critchley a great wrong, and he has well earned his salary and his expenses, whatever they were.

However, we should be more impressed if a proper balance sheet were available. Figures can be made to prove almost anything. During the period in question the corporation was not a free agent in its operations, and it rested with Government departments to arrange priorities. Moreover, in the matter of profit and loss the corporation may, for all we know, have been rather in the position of the farmer's wife who got from her husband free of charge all the grain for her hens and kept the egg money herself. She claimed to be making a profit.

Sub-Arctic Experiment

"WINTERISATION tests" is the horrid expression used by the Ministry of Aircraft Production to denote a very praiseworthy piece of co-operation between the Royal Air Force and the Royal Canadian Air Force. Modern British aircraft types, including the latest versions of the Lincoln and Halifax bombers, the Meteor, Spitfire and Tempest fighters, have been sent to Edmonton, Alberta, to be tried-out under severe winter conditions.

One of the "targets" is to get a heavy bomber into the air in ten minutes, after having its engines started in a temperature of 40 degrees below zero, without any pre-heating of engines or oil, after the aircraft has been out in the open for at least 36 hours. The tests will, however, also include maintenance of aircraft and engines, and the functioning of armament.

The fact that the aircraft and engine firms concerned have sent representatives to Edmonton should ensure that the lessons learnt and the experience gained will be applied at home without delay, and not only to military aircraft but to civil types as well.

It is to be hoped that similar tests will be made in other parts of the Empire so that experience may be gained in solving the very different problems that arise in hot climates. In future British aircraft will be operating in extremes of temperature, sometimes during a single journey, and "summarisation tests" would be as valuable to our designers as the sub-arctic tests now being made in Canada.

In the past there has been too much tendency to design for English conditions, assuming that these will suffice. Experience has shown that this is not the case.

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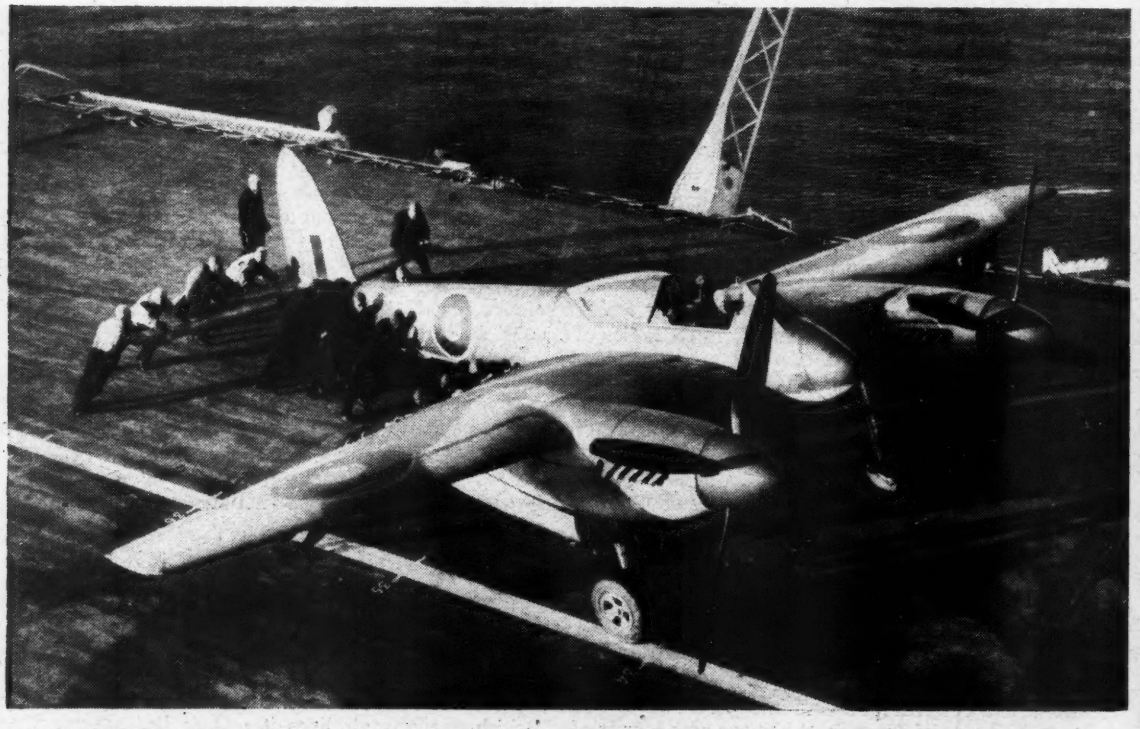
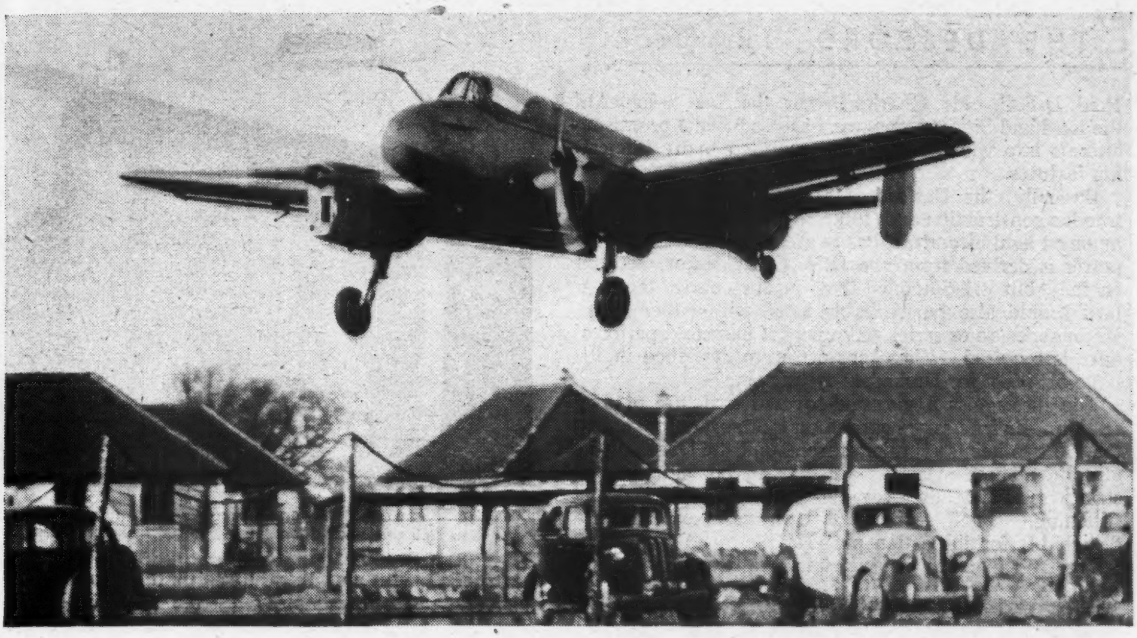


TWIN FIGHTER FOR THE NAVY: Deck handling parties ranging a de Havilland Sea Hornet on the flying deck of H.M.S. *Ocean*. A complete description of the Hornet appears on pages 85–90.



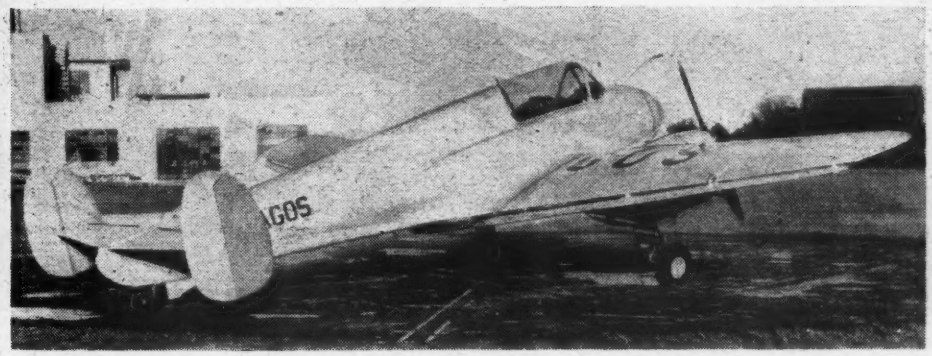
The Desford Trainer approaches to land at its home aerodrome.

The Desford Trainer

A New Twin-engined Trainer Based on the Earlier Reid and Sigrist Design

MOST pilots freely hand out grouses and, not quite so freely, bouquets to the aircraft which they fly. The flying instructor, however, probably becomes more aware of the good and bad characteristics of his aircraft than anyone, and can usually be relied upon to point out this or that which could be altered to the benefit of both instructor and pupil. It is, therefore, interesting to hear that notice has for once been taken of such criticisms and that the recommendations have taken a material form in a training aircraft. The Reid and Sigrist twin-engined Desford clearly displays a pilot's influence behind design and equipment.

At the five Reid and Sigrist flying schools operating during the war, a very large number of R.A.F. pilots received their elementary training. The Desford trainer is in part the outcome of their training experiences. It has been developed from the *Snargasher*, which was primarily a three-seat trainer for combining elementary and intermediate training in a shortened wartime course. Interesting comparative courses of instruction are understood to have been carried out early in the war, using on the one hand this aircraft and a combined course with pupils picked at random, and on the other, the normal elementary and intermediate types of aircraft and separate standard courses. The successful pupils from the courses were then combined at the operational training stage. The results are not all known, but the combined-course pupils are believed to have shown at least equal skill to the others. The Desford also is intended for the training of pilots from the *ab initio* stage to the end of the intermediate stage. The idea of the "compleat trainer" is that of Sqn. Ldr. G. H.



The projection below the fuselage is provided to act as a skid and protect the structure in the event of a tail wheel collapse. The position of the flap hinges may also be seen.

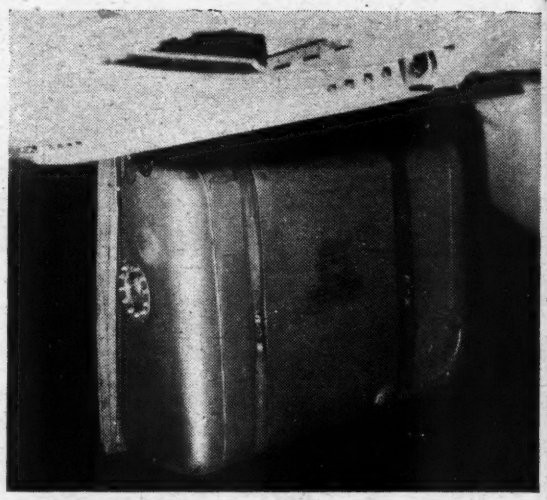
THE DESFORD TRAINER

Reid, D.F.C. Mr. Charles Bower, the chief designer of the Reid and Sigrist company, has produced a promising aircraft into which he has incorporated many interesting features.

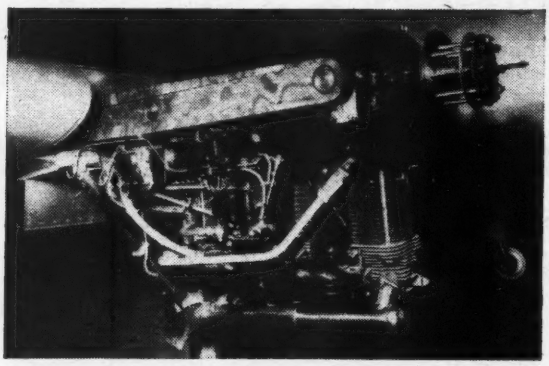
Basically, the Desford is a low-wing monoplane of wooden construction and, following the modern tendency amongst light aircraft, it has twin fins and rudders. The power is derived from two D.H. Gipsy Major, Series I engines, but it is intended that, in due course, the Desford should also be available fitted with either Gipsy Major series 10 or series 30 engines if increased performance is required. These engines were described in the issue of *Flight* for December 27th, 1945.

The fuselage is a plywood-covered structure of oval section. Its frames are carried on four spruce longerons, the top two being unbroken throughout the length of the aircraft. These members are interspaced with parallel stringers, and at the rear end there is additional ply stiffening. Small sections of both nose and tail are detachable for inspection purposes.

The two-spar cantilever wings are also of all-wood construction. In plan, they have a marked trailing-edge taper, the taper being straight from root to tip. In section, the wing thickness is constant from root to engine nacelle and then tapers evenly to the tip.



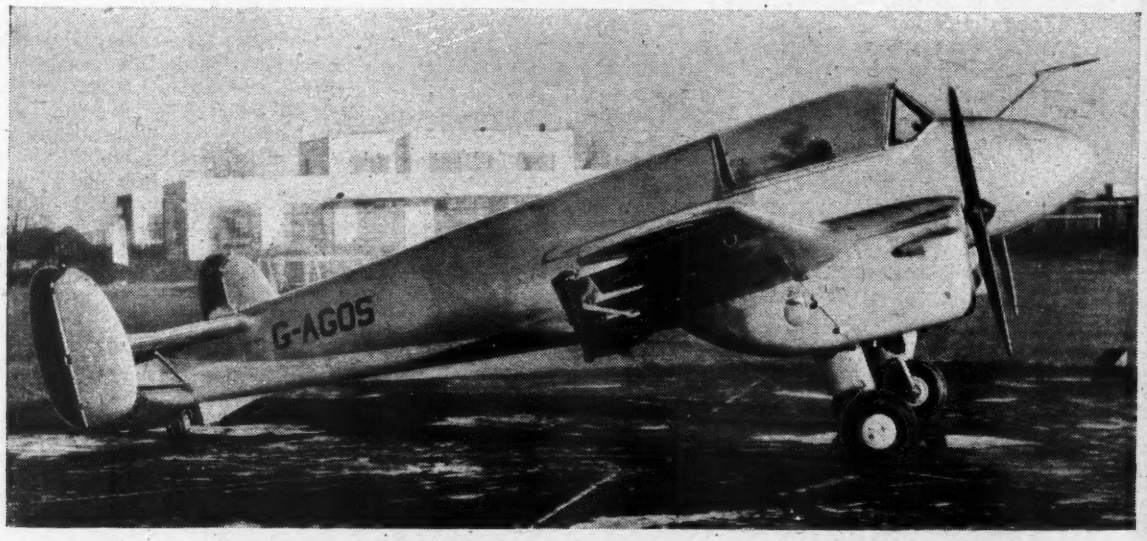
The twenty-two gallon "crash-proof" tanks are attached to and fold out with doors in the lower wing surfaces.



Laminated wood, cantilever engine bearers are used for the Gipsy Major engines and in conjunction with the horizontally-divided cowlings which require no supporting framework, they provide an unusually accessible engine installation.

"Automatic" Flap Control

An unusual feature of the wing assembly is that the ailerons and flaps are both mounted on extended hinges behind and below the trailing edges. The flaps cover the full available trailing edge and are continued below the fuselage. They are operated by a vacuum-controlled ram, the engine induction system supplying the necessary suction. Four flap settings are provided: neutral, climb, approach and touch-down. Flaps and throttle controls are interconnected in such a way that if the flaps are set in the fully down position, and the throttles are opened (as in the case of an overshoot) the flap control is automatically moved from the down position to the 10-deg. take-off setting, thus ensuring maximum lift, immediate reduction of drag and avoiding the risk of sinking-in as a result of bringing the flaps too far up.



The clean cockpit enclosure and fuselage lines are apparent, with the compact engine installation in this photograph.

Overhead, the Desford shows its good proportions and the Junker-like flaps are conspicuous.

This device is of considerable benefit for training purposes, for which this aircraft is primarily intended, but there is always the risk that, once a pupil has become accustomed to having his flaps looked after for him in an emergency he may well forget that there is no such automatic device on other machines.

The twin fins and rudders are mounted at the extreme ends of the cantilever tailplane, and like the remainder of the airframe, the tail unit is of ply-covered wooden construction. The control surfaces are wood with fabric covering and are push-rod operated.

Two fixed, semi-cantilever Lockheed Airdraulic legs comprise the undercarriage. They are widely spaced and fitted with Dunlop wheels and brakes. Differential braking in conjunction with the rudders is obtained when taxying. The tail wheel is a normal Dowty assembly, but the machine is also provided with a solid tail skid immediately ahead of the tail wheel as an additional safeguard against damage in the event of the tail wheel collapsing in an exceptionally heavy landing.

REID AND SIGRIST DESFORD DATA

Span	34ft.
Length	25.5ft.
Height	8.1ft.
Wing area	186 sq. ft.
Tare weight	2,477 lb.
All-up weight	3,300 lb.
Wing loading	17.75 lb./sq. in.
Petrol capacity	44 gall.

ENGINES

D.H. Gipsy Major I.	120-130 h.p.

PERFORMANCE

Max. speed (sea level)	162 m.p.h.
Max. cruising speed	148 m.p.h.
Cruising range	463 miles
Initial rate of climb	1,100ft. min.
Service ceiling	17,700ft.

The four-cylinder, in-line, inverted air-cooled Gipsy Major engines are mounted on laminated wood cantilever bearers, which are anchored to the wing spars. This mounting makes the engines extremely accessible for all general maintenance purposes, and the accessibility is further improved by the neatly detachable engine cowlings. The lower portions of these cowlings are made in one piece and are quickly releasable, each being held in position by five fasteners. The complete cowlings can be removed without disturbing the fixed-pitch wooden airscrews.

A good deal of thought appears to have been given to ease of maintenance on this aircraft. Apart from ease of removal, the cowlings are also provided with three quick-release covers, which provide access to the magnetos, fuel-pump primers and oil filters. In addition, there are six inspection doors in the fuselage for access to the various controls, including one for the back of the instrument panel, and eight on the wings. Another feature of similar type is that the two twenty-two-gallon fuel tanks are mounted on hinged doors on the under surface of the wings between the engine nacelles and the wing roots. These doors, complete with tanks, can be swung down clear of the wing for inspection purposes. The general effect of the liberal provision of inspection doors is to ensure that all normal routine servicing can be carried out from outside the machine without entering the cockpits.

Both the nose and the tail sections of the aircraft are easily detachable, the former making access to the rudder bar and accumulator a simple matter, and the latter leaving clear for maintenance the elevator, trimming tabs, rudder controls and the tail wheel oleo.

The tandem cockpits are comfortable, have dual controls and appear to be well laid out. The front cockpit is intended for the pupil and is fitted with a comprehensive set of instruments, including a standard blind-flying panel. Cockpit heating, operated from either seat, is provided on this aircraft and is to be regarded as a necessary luxury on a two-engine training machine. The one-piece sliding hood can be operated from either seat, four and a half turns of the handle being required for the full travel of the hood. Visibility is very good indeed from both seats, and a reassuring feature for the pilot is that the windscreen structure is reckoned to be sufficiently sturdy to bear the weight of the aircraft should it overturn.

The aircraft has been designed to withstand most extremes of climate, and if desired it could be adapted for use as a communication aircraft. A total range up to 1,500 miles can be obtained by fitting an additional faired-in midwing, under-belly tank. There is also a scheme for an alternative wider fuselage to seat 4-5 persons, and for providing increased power by fitting Gipsy 30 series engines, so that the aircraft can be used as a small passenger-carrying machine.

Fireflies for the Dutch Navy

Holland Selects Fairey Aircraft : Christening Ceremony at Heston

AT an informal ceremony, in arctic conditions, at Heston Aerodrome on Friday, January 18, the first of a batch of Fairey Firefly I aircraft was officially christened and handed over to the Dutch Navy.

After a few introductory words in English and Dutch by Rear-Admiral P. J. Feteris, R.N.N., Mrs. Beets, wife of Lt. Comdr. Beets, R.N.N., released the catch on an arrester hook which swung down breaking a bottle of champagne over the spinner of Firefly *Pionier*.

Mrs. Beets said in Dutch that she was proud to have been chosen to christen this first aircraft (to be supplied by England to Holland after the war) and that she named it *Pionier*. She did, in fact, choose this appropriate name herself, having in mind, as she explained, the first Dutch settlers to sail for America who are usually referred to as the Pioneers.

The first order of fifteen aircraft is for the equipment of No. 860 Squadron of the Dutch Naval Air Arm. After a period of training with their Fireflies, the Squadron will probably move to their home country and later to the Dutch Indies. A second Dutch Squadron may be equipped with Fireflies.

It will be remembered that the Firefly I is powered by the Rolls-Royce Griffon engine and is chiefly distinguishable from the Firefly IV by the chin-positioned radiator.

This two-seater reconnaissance fighter will be no newcomer to the Far East, having operated against the Japanese with distinction during the later stages of the war in the Pacific area.

Of those officiating or present at the ceremony, Rear-Admiral Slattery, who is Vice-Controller (Air) and Chief Naval Representative at M.A.P., has been associated with the Firefly since its conception. Rear-Admiral Feteris, who was recently promoted to the position of senior officer on the material side of the Dutch Navy, was supported by members of the buying committee and several of the Dutch Naval and Marine pilots who are to fly the Fireflies.

The *Pionier* is christened with well-iced champagne at Heston airport. Among those present were Rear-Admiral Slattery, R.N. and Rear-Admiral Feteris, R.N.N.

After the christening ceremony, Mrs. Beets, wife of Lt. Cdr. Beets, R.N.N., was shown the controls of the Fairey Firefly by Lt. Cdr. B. Sjerp. Note the Dutch Naval markings.

FAIREY DESIGNERS FORGATHER

THE design staff of the Fairey Aviation Co., Ltd., of Hayes, held its second annual dinner at the Connaught Rooms, London, last Friday. Dr. D. L. Hollis-Williams, B.Sc., F.R.Ae.S., the chief engineer, presided over a splendid gathering which included Fairey directors and men and women of the drawing office staff, as well as Service representatives, Rear Admiral M. S. Slattery, C.B., R.N., Group Capt. D. R. S. Bader, R.A.F., and Wing Cdr. D. Crowley-Milling, R.A.F.

Speakers emphasised the pioneer work and proud history of the firm and its range of aircraft from the little Sea Fox to the Firefly IV and now the Spearfish. Fifteen members of the design staff present at the dinner each had 20 years' service with the firm. The nucleus of the team includes Mr. F. H. Ordidge, Mr. A. C. Brown, Mr. H. E. Chaplin (included in the recent Honours List), Mr. Frank Bolton, Mr. Wakefield and Mr. W. W. Greenfield.

HALTON CALLING

AIRCRAFT apprentices are urgently required by the R.A.F. for training at the R.A.F. School of Technical Training at Halton. Eight hundred boy apprentices are wanted immediately and they must be between 15½ and 17 years of age on May 1st, 1946. Candidates are expected to pass an entrance examination covering mathematics, science, essay, English, a general paper, and an intelligence test, but boys who have already passed a first School Certificate Examination with credit in mathematics and one science subject need only take the intelligence test.

The examination for the May, 1946, entry will be held at local centres on February 26th, and nominations for this examination must reach the Air Ministry (E.S.2(C)), Alexandra House, Kingsway, W.C.2, by next Tuesday, January 29th.

Candidates should be nominated by the headmasters of their schools, from whom they can obtain full particulars of the Aircraft Apprentice Scheme, or, if they have left school, should apply to the nearest Juvenile Advisory Committee.

HERE AND THERE

V.I.P.—Viking In Production : Lord Winster (front right) takes a ride in one of the first off the line, accompanied by George Edwards, the chief designer, and B. W. Dickson (behind him), J. Summers, chief test pilot (standing), and Major Kilner (rear left.)

"Smithy" Filmed

THE promised film on the life of the late Sir Charles Kingsford Smith, on which work was begun nearly two years ago in Australia, is expected to reach the screen by Easter.

All the actual "shooting" is now finished and the reels have gone to the Sydney studios for cutting and editing.

Incidentally, the real star featured in this film is "Smithy's" famous old three-engined Fokker monoplane, *Southern Cross*, which was brought out of its honorable retirement and put into flying order once again.

Contrast

THE point raised in the correspondence columns of *Flight*, Jan. 17th, by "Rebel," on the relative positions of light aircraft manufacture in Britain and the U.S. is emphasised by statistics just to hand from the Aircraft Industries Association of America, Inc.

Manufacturers of personal aircraft in the U.S., the Association reports, are all going ahead rapidly with reconversion to peacetime production and several have already completed their plans. Although quantity production is not expected for several months, it is estimated that together these firms will turn out over 30,000 units during 1946, to the value of $100,000,000—roughly £25,000,000.

"Flight" Photographs

MORE than 160 different types of aircraft of the R.A.F., N.A.A., R.F.C., and R.N.A.S., together with a smaller selection of German types, are available for purchase in postcard size from *Flight*, and a complete list with sample photograph may be had for 8d., including postage.

These photographs are priced at 8d. each, but this is reduced to 7½d. when not less than a dozen are ordered. All orders should be accompanied by the necessary cash and sent to the Publishing Dept., *Flight*, Dorset House, Stamford Street, London, S.E.1.

Civic Pride

GIVING Britain's chief airport the name of Heathrow has, it seems, trodden on the tender corns of the good people of West Drayton and the parish of Harmondsworth.

According to a recent statement to the Press by Mr. W. T. Morgan, engineer and surveyor to the West Drayton U.D.C., it was his council which first proposed an airfield there as long ago as 1933, and they are even more hurt when it is described as "near Staines," which is much farther away. Harmondsworth is the parish in which it actually lies.

Pacific Security

AIR VICE-MARSHAL RONALD GRAHAM, head of the Air Section of the United Kingdom Mission to Australia, stated in Wellington last week that New Zealand should be strongly represented on the air side in any Pacific defence system in view of its dependence on air communications.

A.V-M. Graham is in New Zealand to help introduce standardisation, organisation and the practice of air defence within the Empire on a British Commonwealth basis so that the whole system may be interlocking and interchangeable.

Technifilms

SILENT films, with a running commentary by the instructor, have been found to give even better results (at considerably less cost) in the instruction of engineer apprentices undergoing technical training at the Fairey Aviation Co. than do talkie films providing a set commentary.

The chief reason for this is that, when a student fails to grasp some point and asks a question about it, the instructor can run the film back and repeat the pertinent part while giving the answer.

Flight recently saw a sample of the films used in the Fairey syllabus and they proved a most effective substitute for the classroom blackboard, various

STILL ON 'OPS': The persistent trouble in Java means that the war is not yet over for these three aircraftmen of No. 3210 Servicing Commando Unit of the R.A.F. stationed at Hmawbi, nor for the crew of the Mosquito they are preparing for the next sortie.

HERE AND THERE

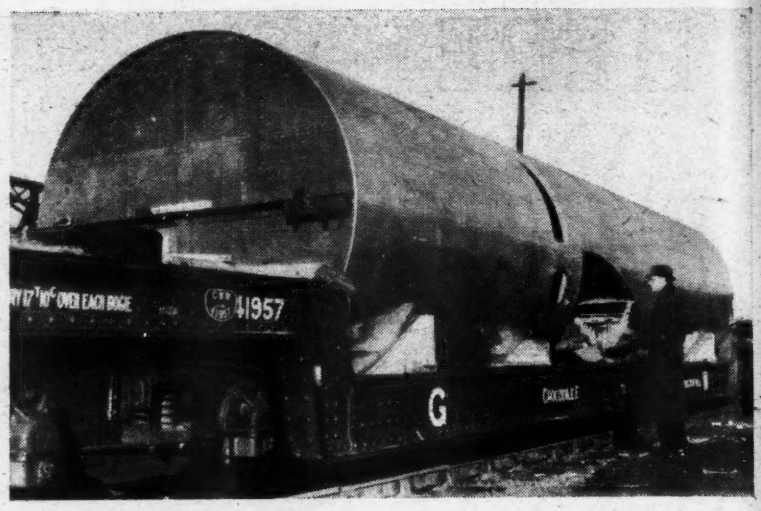
machining and other operations shown were taken slowly so that the instructor would not have to rush his explanations.

The films have been found particularly helpful in familiarising embryo draughtsmen with production methods, and errors which cropped up before their introduction into the training syllabus are not now being repeated.

The Veteran

A SERVICE record that, one imagines, will not be beaten by many still in the R.A.F., is that of Wing Cdr. "Sammy" Mather, Chief Technical Officer at Lydda, Palestine, who is now on his fifth overseas tour.

He was one of the first 2,000 men to join the R.F.C.—he joined in 1914—and with over 30 years' continuous service still has five years to go. During the first World War he served in Egypt, the Sudan, and Salonika, did two tours in Iraq between wars, and served in Canada during World War II before going to Palestine.



STEADY PROGRESS: A half-size fuselage centre-section of the Brabazon I, measuring 40ft. × 8ft. 5in., was recently taken by rail from Bristol to Farnborough to undergo structure tests The impressive size of the actual aircraft can be imagined from this picture.

News in Brief

WHILE carrying out a "deck level" reconnaissance over a village 50 miles east of Batavia recently, an R.A.F. Thunderbolt pilot reported that he saw one Indonesian stand his ground in the street and hurl a spear which "flashed under the wing."

* * *

The Battle of Britain was won on the asphalt playgrounds of the secondary schools, Mr. James Griffiths, Minister of National Insurance, told youth leaders at Carmarthen recently, adding that the youth movement had a great impetus when the nation realised this.

* * *

Some units of the permanent R.C.A.F. are to be equipped with Canadian-built jet-propelled aircraft, orders for which have been placed with the A. V. Roe Co. (Canada), Ltd., which took over the plant of Victory Aircraft at Malton, Ontario. It is added that "a period of intensive research" will be necessary before the first one takes the air.

* * *

The Fleet Air Arm station at Sydenham, Belfast, is to be established as a permanent base. The Admiralty spent large sums in the development of this station during the war, and it is reported that a civilian establishment will find work for some 200 ex-Servicemen from the R.A.F. and F.A.A. who are trained in aircraft trades.

* * *

A new America-India record for the U.S Air Transport Command has been set up by Brig. Gen. Charles W. Lawrence, commanding the India-China Division of the U.S.A.T.C., with a 10,800 miles flight from Morrison Field, Florida, to Barrackpore, Calcutta, in 44 hr. 30 min. The aircraft was a C-54 Skymaster and the route included stops at Bermuda, the Azores, Casablanca, Cairo and Karachi.

* * *

The five U.S. Pacific Air Forces have now been grouped under one command—the Pacific Air Command of the U.S. Army—under Lt. Gen. Kenney, former commander of the U.S. Far Eastern Air Forces. "Pacusa" (as it is already called) comprises the 5th Air Force in Tokyo, the 7th in Hawaii, the 8th in the Moluccas, the 13th in the Philippines, and the 20th in the Marianas.

* * *

Mr. Wilfred H. Sutcliffe has joined the Dunlop Rim & Wheel Co. and will be in charge of the test and other flying work so necessary in the development of ancillary aircraft items. During the war Mr. Sutcliffe has been successively test pilot with Rolls-Royce, Rootes and Lockheed, though he will probably best be remembered as chief instructor and secretary of the Midland Aero Club.

* * *

Mr. G. W. Lacey, general sales manager of the British Aluminium Co., Ltd., has been appointed to the company's board; Mr. E. A. Langham becomes manager of the sales division, and Mr. A. W. Langham, who has been acting sales manager, now becomes sales planning manager.

* * *

The Curtiss-Wright Research Laboratory will be known in future as the Cornell Aeronautical Laboratory, the title having been passed to Cornell University as a gift from Curtiss-Wright sponsored by eight of the Eastern aircraft manufacturers.

* * *

Mr. Mark M. Cansick, formerly commercial manager and publicity manager of Specialloid, Ltd., has been appointed the company's secretary as from December 1st, 1945. Mr. Cansick will continue to handle the firm's publicity.

* * *

Percival Aircraft, Ltd., staged an exhibition at the Army's No. 5 Formation College at Luton Hoo, recently opened by the Secretary for War, Mr. T. Lawson. The college is one of five being established to equip Army personnel for their return to civilian life, and 800 students a month are now taking the various courses. The Percival exhibition includes a section of a Mosquito fuselage and a Gipsy Queen II engine in addition to a selection of Proctor components.

* * *

The first provincial branch of the Helicopter Society of Great Britain was formed in Sheffield last week. One of its objects is to link Sheffield with the proposed South Yorkshire airport at Doncaster.

* * *

Sqn. Ldr. J. G. D. Armour, whose exhibitions of aerobatics and crazy flying delighted thousands in the years gone by, has rejoined his old firm, the Henderson Safety Tank Co., Ltd., at Boreham Wood, and will be looking up old friends again. During the war he was chief flying instructor to No. 45 Group, Transport Command.

* * *

Mr. G. W. Baker, sales manager of the AC-Sphinx Sparking Plug Co., Ltd., sailed in the *Queen Elizabeth* on January 9th on a business trip to the U.S. He hopes to be back in England by April.

* * *

Dr. Gano Dunn, a past president of the American Institute of Electrical Engineers, has been elected a vice-chairman of the International Executive Council of the World Power Conference.

* * *

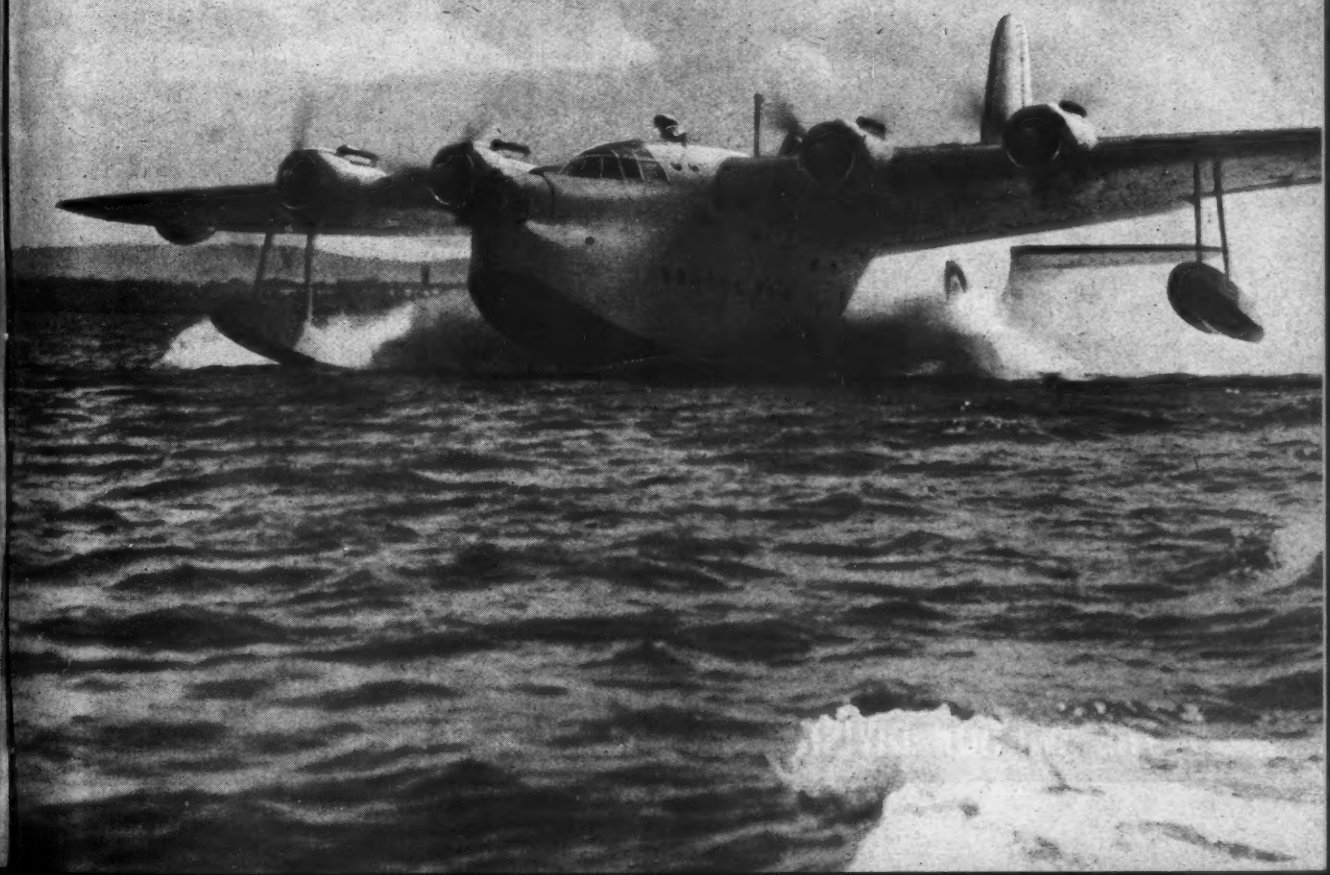
Mr. R. M. Parkinson, research engineer to Rotol, Ltd., for the past seven years, is now leaving that company to start in business at The Gray House, Harp Hill, Cheltenham, as an engineering consultant specialising in internal combustion engine problems.

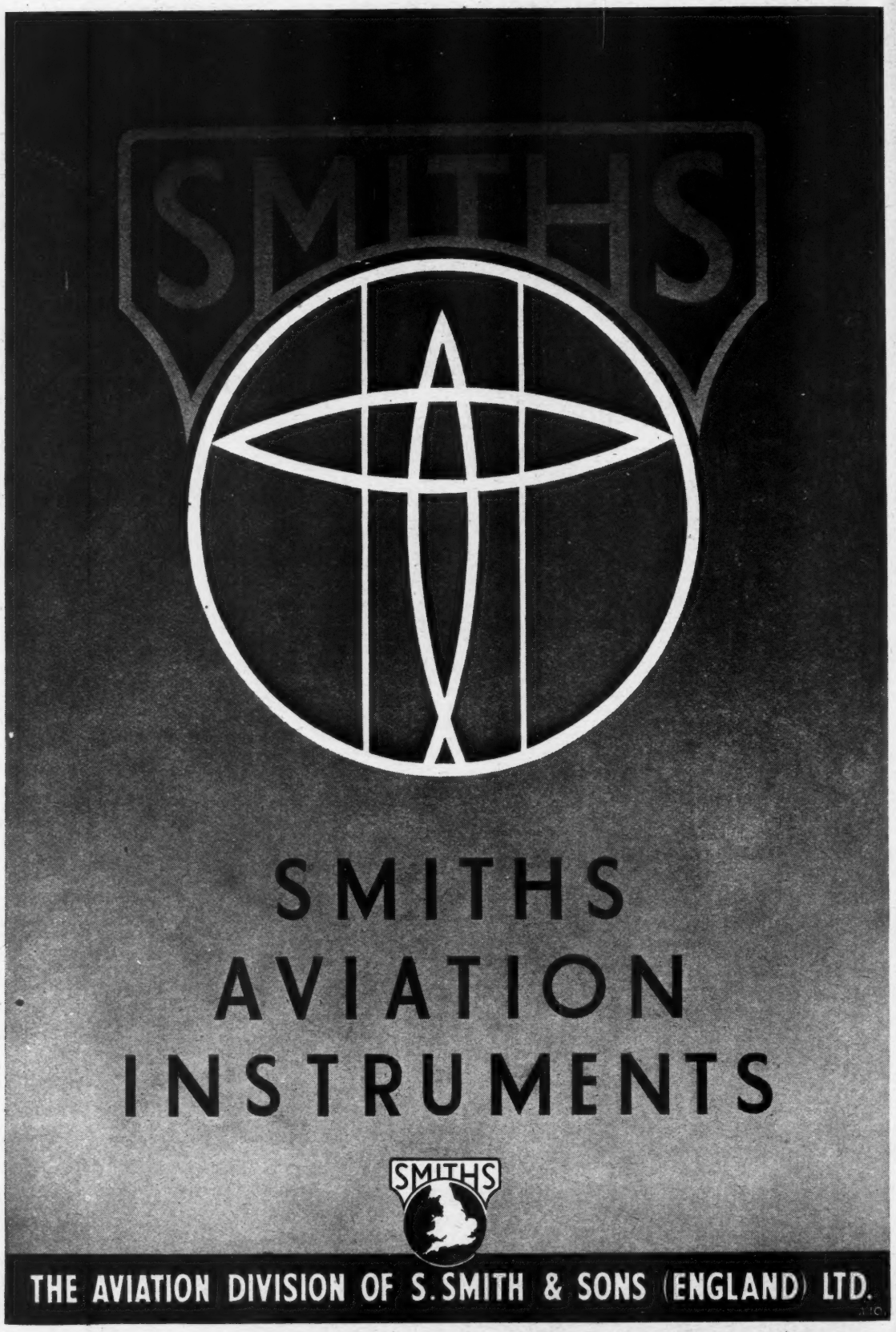
* * *

We are asked to correct an *Air Ministry News Service* item announcing the formation of the R.A.F. Mediterranean Association, which was published in *Flight*, December 20, 1945. "Membership of the Association," the correction reads, "is actually confined to officers on the strength of the Headquarters Unit of E.A.C., N.A.A.F., M.A.A.F., or M.E.D.M.E. (Caserta) and not to units under their control or officers of the Middle East."

DH PROPELLERS

All Short Sunderland flying boats in service with the Royal Air Force and civil airline operators are fitted with de Havilland Hydromatic Propellers

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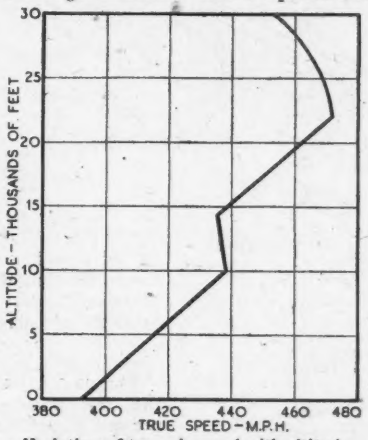
The D.H. Hornet

An Outstanding Two-engined Fighter: Combination of Wood and Metal Construction: Compact Installation of Merlin 130 and 131 Engines: The Sea Hornet

IN view of the outstanding popularity and success of the Mosquito on its many wartime duties, it is logical that the production of both a smaller and a larger aircraft of similar design should have been considered by the de Havilland company. The larger project, the DH 102, has not been followed up, but the smaller version, the DH 103, now known as the Hornet, has already shown itself to be a very worthy offspring of the Mosquito. This outstanding two-engined fighter was to some extent built around its Rolls-Royce Merlin engines, and although it was not planned to meet any specification existing at that time there was a clear conception of the duties it was to perform and the performance expected. Briefly, a fighter was envisaged which would have speed, climb and manœuvrability rather better than other comparable aircraft, and a range in excess of all.

For a number of reasons a two-engined design was demanded, and an aircraft of similar layout to the Mosquito was agreed upon. The size was determined as the minimum reasonably required to house the engines. Some weeks before the Hornet was conceived, the Rolls-Royce company had suggested the Merlin 130, the most recent addition to their range, as replacement engines in the latest marks of Mosquito. The 130 lent itself to exceptionally close cowling, and the power available at all altitudes from this "Schneiderised" engine showed considerable improvement over earlier marks of Merlin. (A full description of this series of Merlins is given on pp. 92-94.)

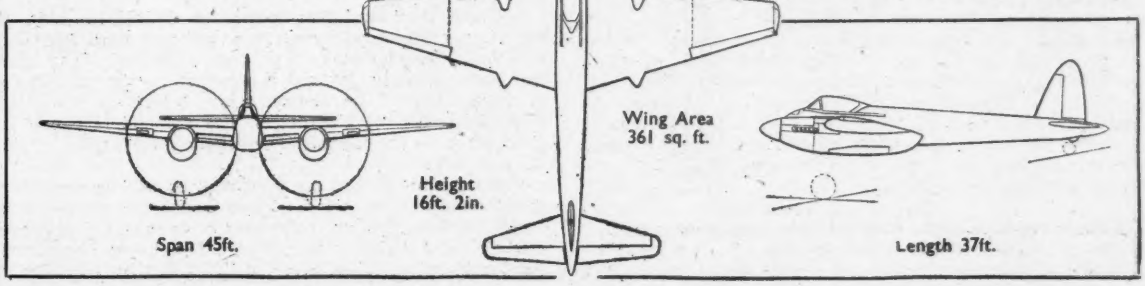


Variation of true air speed with altitude for a Hornet carrying no external tanks or armament and using combat power rating. Engine conditions are 3,000 r.p.m. with 20 lb./sq. in. boost. Maximum speed 472 m.p.h. at 22,000ft.

In determining the acceptable wing loading, it was borne in mind that fully loaded Mosquitos on night operations flew without undue trouble at a wing loading of 42 lb./sq. in., and a slightly larger figure was finally applied to the Hornet.

To obtain the lightest and most compact engine installations possible, main radiators, intercooler radiators and the supercharger air intakes are all placed in the leading edges of the main planes. To minimise moment the engines are as close inboard as airscrew clearance permits, and for the same reason they are backed tight up against the bulkheads, which are themselves level with the front spar. The installation is also very low in the wing in order to give a clean, uninterrupted top surface.

It had originally been the intention to fit handed engines turning "in and up," but when this arrangement was tested the slipstreams were found to be so deflected that



THE D.H. HORNET

the tail control surfaces were ineffective on take-off speeds under 80 m.p.h. While there was no inherent tendency to swing on take-off or even a likelihood of it with this arrangement, the possibility of the aircraft being deflected from its course by an external influence, and the subsequent difficulty in correcting, could not be overlooked. Handed engines turning "down and in" were, therefore, fitted, and, although the stabilising effect of the arrangement was lost, directional control on take-off and landing was satisfactory.

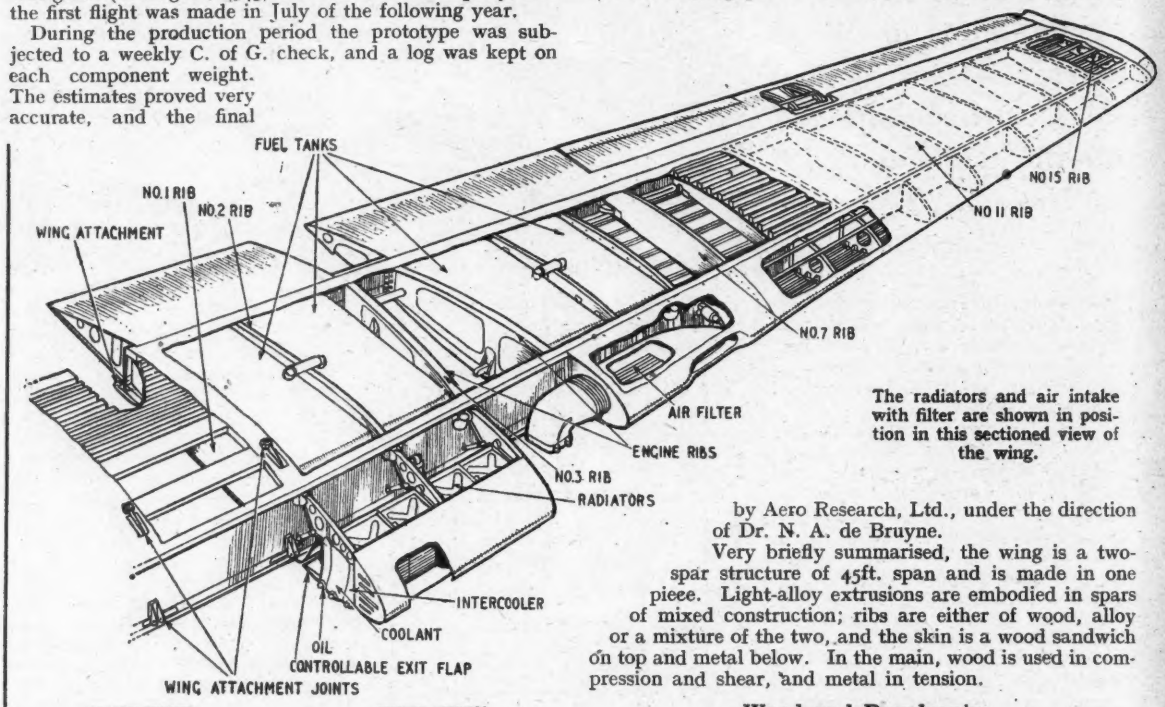
There was a considerable delay after the mock-up stage was reached on the prototype Hornet, but once approval was given (in August, 1943) work went ahead rapidly, and the first flight was made in July of the following year.

During the production period the prototype was subjected to a weekly C. of G. check, and a log was kept on each component weight. The estimates proved very accurate, and the final weight was within 200 lb. and, unusually, on the right side!

In view of the high performance expected of the Hornet, it was apparent that a safety factor of ten would be required, so while the Mosquito type of construction was quite suitable for the fuselage, the wing called for different treatment.

The N.P.L. were behind the design for the wing section, which is similar to that of the Vampire, but with rather less camber. It is understood to have proved satisfactory up to very high diving speeds, with Mach numbers in the region of 0.78 at altitudes and 0.72 lower down.

In a wing of reasonable depth, it was not possible to obtain the requisite strength and rigidity from all-wood construction, and it is in the ingenious combination of wood and metal in the design of the Hornet wing that the main structural interest lies. Wide use is made of the Redux bonding process introduced some three years ago by Aero Research, Ltd., under the direction of Dr. N. A. de Bruyne.



The radiators and air intake with filter are shown in position in this sectioned view of the wing.

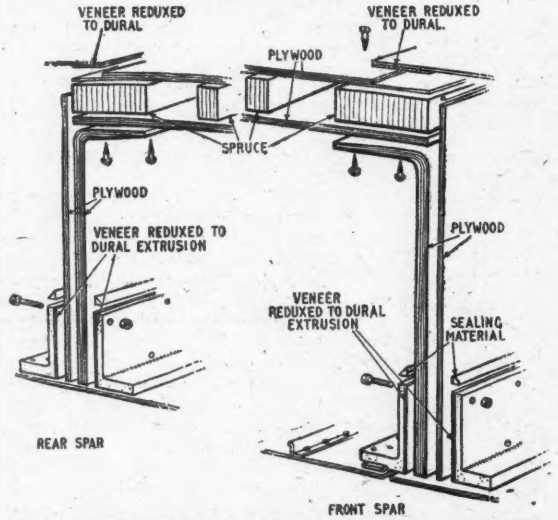
Very briefly summarised, the wing is a two-spar structure of 45ft. span and is made in one piece. Light-alloy extrusions are embodied in spars of mixed construction; ribs are either of wood, alloy or a mixture of the two, and the skin is a wood sandwich on top and metal below. In the main, wood is used in compression and shear, and metal in tension.

Wood and Duralumin

The lower booms of the spars are dural extrusions, the top booms are of spruce and the webs compressed plywood. Details of construction are shown in the illustrations. It will be seen that the bottom boom comprises two duralumin right-angle extrusions to each of which is bonded a wood veneer. The two are cold-glued and bolted to the compressed ply web, and the joint is finished off with a layer of Chatterton's compound as a protection. At the top, the ply veneers of the web are separated and the thicker section curved over at right angles to meet the under surface of the top boom. The remaining thinner section of the web is glued to the front face of the boom.

Between front and rear spars, the double top skin of the wing is reinforced by spanwise stringers narrower than but similar to the spruce top boom. The skin is of glue and screw construction and is attached to the top booms in this manner. The bottom skin, which is of alclad reinforced with dural stringers, has detachable panels to give access to the tanks. These panels are a part of the stressed skin.

Various types of ribs are used and, as will be seen from the drawings, there are fifteen in each main plane. The centre fuselage pair are composed of compressed plywood sandwiched between alloy sheet. The lower booms are duralumin extrusions of inverted "T" section, the upright

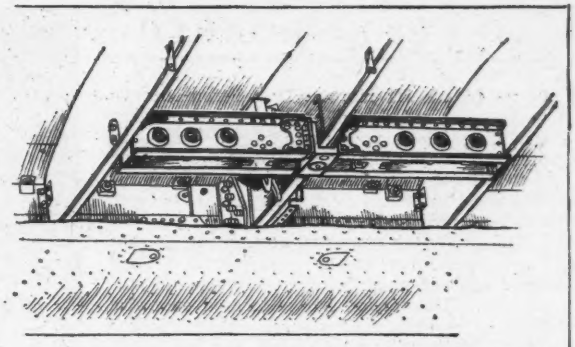


The composition of the front and rear wing spars is clearly shown in this drawing.

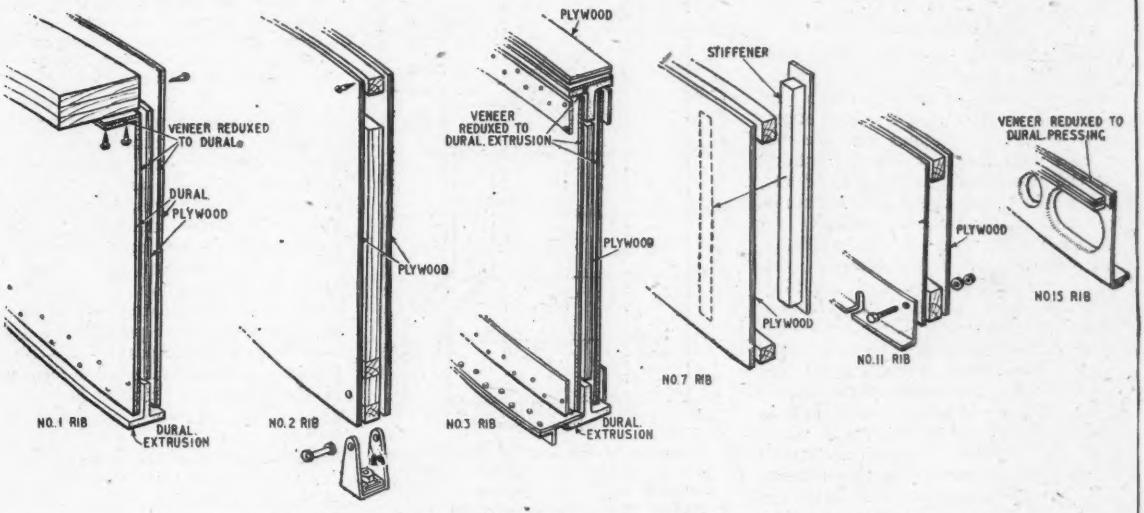
limb being riveted between the alloy sheets of the web, which overlap the edge of the plywood for this purpose. The top boom is of spruce, glued and screwed like the main spar. Number six ribs are a scaled-down version of the number ones. Numbers two, five, seven and eleven ribs are each built up from plywood sheet screwed and glued to spruce frames. Two and five carry pick-up fittings for the tank doors, while seven and eleven have metal flanges.

Metal-clad

The engine ribs, numbers three and four, are alloy/ply/alloy sandwiches rather similar to the fuselage ribs but having "T" section extrusions for both top and bottom booms. The top skin is glued to the top booms after a thin veneer has been Reduxed to them. With the exception of number fifteen, which is an all-metal pressing, the remaining ribs are built up with single plywood webs screwed and glued to spruce booms.



An example of inter-rib strengthening members in the wing for attachment of drop tanks or R.P. gear.



Details of rib construction can be followed in conjunction with the illustration on the facing page.

To ensure a smooth surface and torsional stiffness in the wing, the leading edges are of all-metal construction. Except for their attachment by Reduxing to the top of the front spar they are quite conventional. The attachment and construction of the all-metal flap and aileron shrouds is similar to that of the leading edge.

Six main bolts and fittings attach the wing to the fuselage and, like the Mosquito, the Hornet has a balsa-ply sandwich fuselage made in halves split vertically. Small differences are the use of a thinner balsa core to the sandwich, which saves about one-third of balsa weight, and the use of duralumin strengthening plates on the fuselage walls for the attachment of equipment and the like. On the Mosquito, plastic plates or attachment ferrules are generally used, and bolt holes are necessarily wide apart to prevent splitting. By the use of Redux bonding, small metal plates can be substituted for the plastic ones with considerable advantage. On the underside of the fuselage just aft of the rear spar is a hatch giving access to equipment and control cables.

PRINCIPAL DATA AND PERFORMANCE FIGURES

Engines.	R.R. Merlins 130 (R.H. port) 131 (L.H. starboard).
Airscrews.	D.H. Narrow, 4-blade, 12ft. diameter.
Wing span	45ft.
,, area	361 sq. ft.
,, loading	44.5ft.
Length	37ft.
Height—tail up	16ft. 2in.
,, tail down	14ft. 2in.
Tail span	18ft. 1½in.
Max. speed	473 m.p.h. at 22,000ft.
,, range	2,900 miles.
,, climb	4,000ft./min. to 15,000ft.
Operational ceiling	35,000ft.

Type	Condition	Weight lb.	Total fuel capacity gal.
Fighter	Short-range Long-range	16,100 20,900	358 928
Photographic Reconnaissance	Short-range Long-range	15,900 20,200	418 928

The Tail

The tailplane is of conventional two-spar all-metal construction, with ribs from the rubber press. By virtue of its attachment it is adjustable for rigging, two turnbuckle-type fittings being incorporated. Later marks of Hornet have two extra ribs in the tailplane, with a corresponding increase in span. This modification followed the adoption of "down and in" airscrew rotation and to some extent offsets the de-stabilising effect of this arrangement. The area of the horn balances was also slightly increased.

The tail fin is of all-metal construction and does not call for any special attention. The addition of a fairly long shallow dorsal fairing up to the fin is now under consideration.

All elevator and rudder control mechanisms on the Hornet are placed behind the fin and are exposed for inspection when the tail cone is removed.

Both frame and covering of the main controls are metal, and in each case they are noticeably flat-sided, no doubt to obviate any tendency towards reversal at high altitudes.

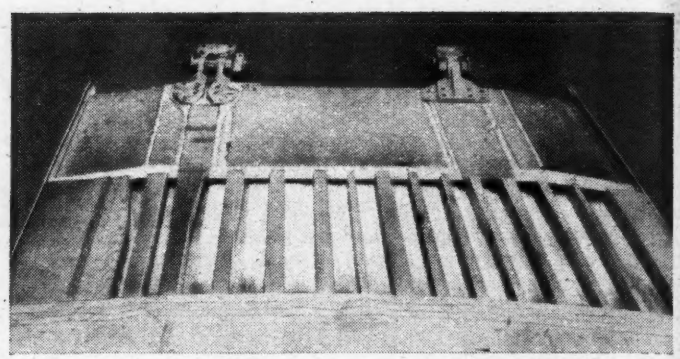
THE D.H. HORNET

On the Mark III Hornet, the aileron shrouds have been redesigned, and an independent trimming tab is now fitted to the starboard aileron. Aerodynamically the ailerons proved very sensitive to shrouding, and although it was not planned at first, a little nose balance has been provided.

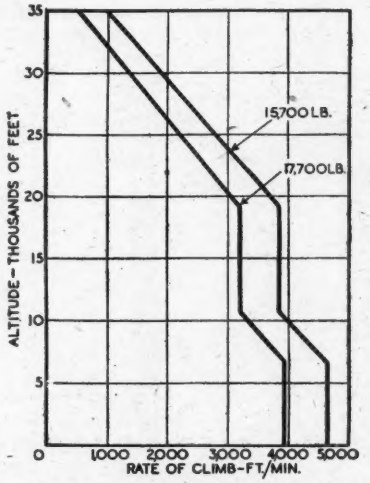
The spring-tab operating unit on the ailerons employs the torsion-bar principle, and until the surface is under load the tab remains stationary. The torsion bar is located spanwise between two ribs and is some eighteen inches long. As the aileron is loaded, the bar winds up until a stop is reached, and from that point the movement of the control is positive.

Air Intakes

An interesting departure from conventional arrangement is found in the induction air intakes. These are situated in the wing leading edges, outboard of the engines, and are connected with the supercharger intakes of the down-draught type by ducts, the whole layout being rather reminiscent of the air-cooling system for Gipsy Twelve engines. In addition, a rotating valve interconnected with the undercarriage brings an air filter into use when the wheels are lowered, that is, whenever the aircraft is on the ground. A Vokes air filter is situated in the lower wall of each duct, and suction from the engine supercharger opens a series of hinged metal gills in the lower surface of the wings below the filter. When the main air intake is opened on retracting the landing gear the gills drop back flush with the wing surface and the filter no longer operates. The layout of the system in the wing is shown in a drawing on a previous page.



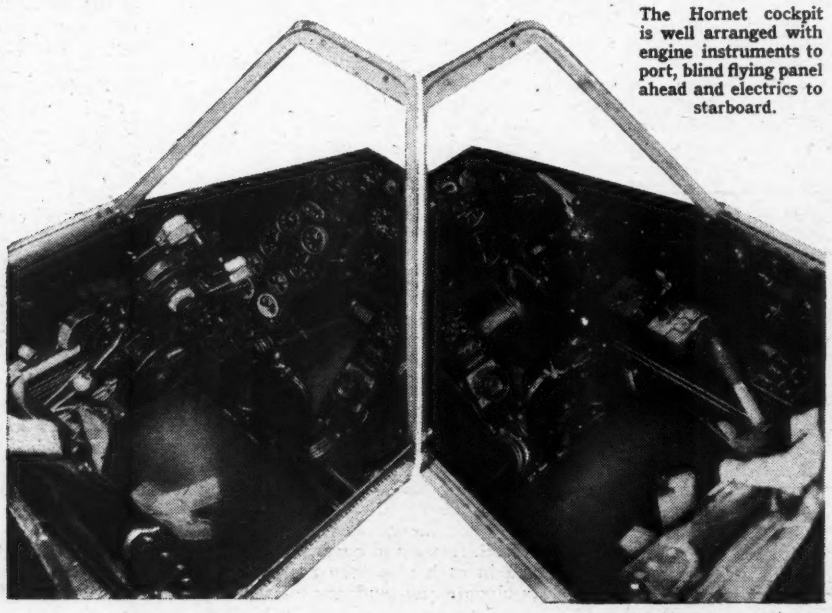
The folding wing hinge fittings are bolted to a metal "belt" composed as shown of alloy sheets let in between the plywood sheets of the top skin. The top halves of the stringers and the outside skin have yet to be replaced. See also Fig. C.



Variation in the rate of climb with change of altitude. With maximum internal fuel load, fighter or P.R. version of the Hornet are capable of averaging 3,500 ft./min. climb to 20,000 ft. at combat rating and more than 4,000 ft./min. in the case of the short-range fighter version.

Another feature making for a clean, compact engine installation is the radiator arrangement. As in the Mosquito, the radiators are placed in the inboard leading edges, but the supercharger intercooler radiators are added to the main coolant and oil radiators. The order, counting from front to rear, is intercooler, main coolant, oil. The complicated plumbing is simplified as far as possible by both inlet and outlet pipes leading direct from the outboard side of the radiators to the appropriate points on the engines. The air outlet flap from the radiators are located on the under wing surface near the front spar like those on the Mosquito and are automatically controlled through part of their travel.

Each main wheel is carried on a single leg sprung by rubber blocks in compression. The retractable tail wheel has rubber compression springing and Ferodo friction disc dampers. Retraction normally takes 7 seconds. In the event of hydraulic pump failure, a hand pump, also an emergency air system, are provided to lower the wheels.



The Hornet cockpit is well arranged with engine instruments to port, blind flying panel ahead and electrics to starboard.

According to duties, whether P.R.U. or standard fighter, up to twelve tanks can be carried, ten being internal and of the self-sealing type. The main tankage comprises two tanks in each main plane, inboard of the engines, and one fuselage tank behind and below the pilot. To these basic five can be added another fuselage tank, four more wing tanks in pairs, outboard of each engine, and two drop tanks of either 100 or 200 gallons capacity.

All tanks feed to the common central fuel gallery, and either engine separately may

Technical Development

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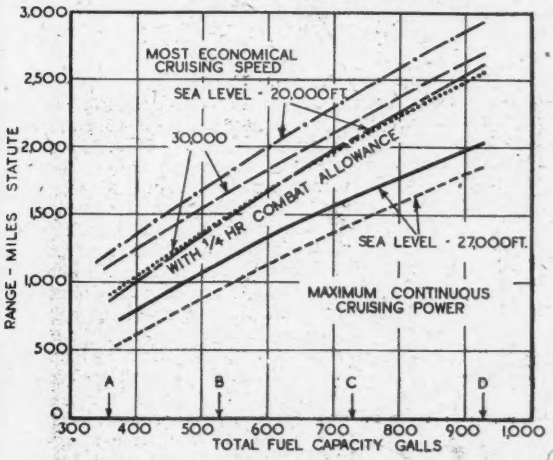
THE D.H. HORNET

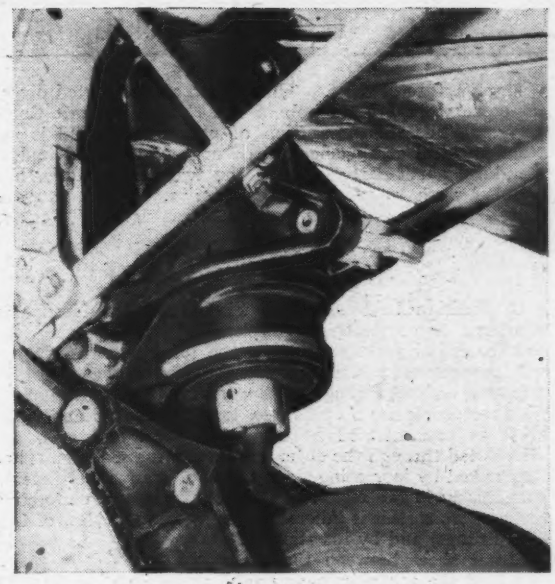
be isolated from the fuel system. The pneumatically operated balance-cock is spring-loaded for opening in the event of pneumatic failure.

Of the two Merlin engines, the 130 has right-hand rotation and the 131 left, the difference being achieved simply by the introduction of an idler gear in the reduction gear assembly. The engine bearers have a four-point attachment at the bulkhead and are of a new D.H. design. The cowling is quickly detachable, and large over-centre catches are used in place of the normal screw fasteners both on these and the cannon inspection panels.

Cable operation is employed for the engine controls, and



The six curves represent from top to bottom :—One and two, the most economical cruising range from sea level to 20,000ft. and at 30,000ft. respectively ; three and four (dotted), the same, but with allowance for ¼-hr. combat at the altitude ; five, the maximum continuous cruising range from sea level to 27,000ft., and six the same with ¼-hr. combat allowance. Letters A, B, C and D indicate respectively the following fuel loads :—Standard, maximum internal, maximum internal plus 100 gall. drop tanks, maximum possible, including 200 gall. drop tanks.



A hold back snap coupling is provided on the Sea Hornet in connection with accelerated take off. The tongue is here seen attached to lugs on the tailwheel compression leg.

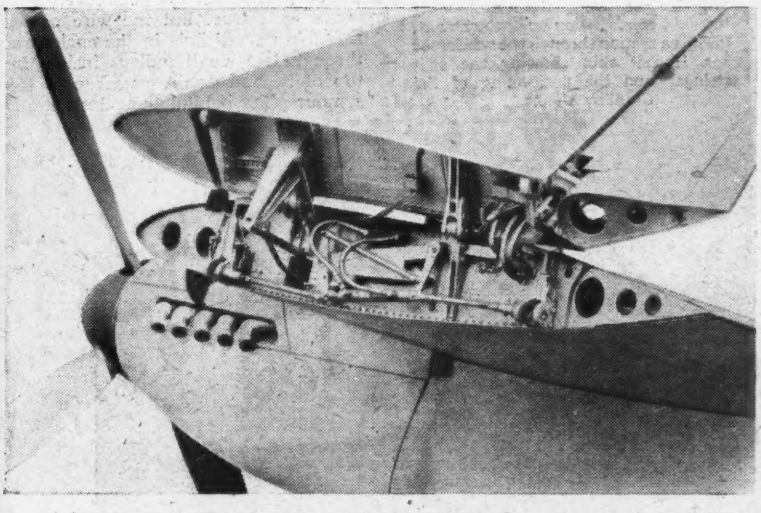
the throttle lever has a 50 per cent. increase in travel over that of the Mosquito. This will give the finer movement required to meet the 100 per cent increase in engine power over early Merlins and will make for easier movement, overstiff throttles being a slight fault of most Mosquitos.

The Cockpit and Visibility

Very properly the cockpit has received a great deal of attention, and the aim of first-class view has been achieved. For long-range work a pilot must not be at all cramped for space. On the other hand, for low weight and good performance, minimum dimensions are essential. The Hornet cockpit seems to be a fair compromise. Although the screen is made in three panels, the joints are so arranged optically that the frame member at the joint cannot be seen from inside the cockpit, and view appears to be continuous. In fact, a thin strip, about half an inch wide, is lost to view at each joint of the front panel, but as these strips are parallel-sided there is no increased loss due to divergent lines of vision, as is usually the case with frame members. The cockpit enclosure is a single transparent moulding which will slide far back down the fuselage to give access to equipment and ammunition boxes located behind the pilot's seat. A chain-and-crank mechanism is employed to open or shut the enclosure.

Adjustment for both height and tilt is provided on the pilot's seat, and pedal-length adjustment is similar to that of the Mosquito. No anti-"g" pedals are provided, but the normal position is high with this purpose in mind.

The Hornet carries four 20 mm. cannons grouped in the lower part of the fuselage nose, to which access is given by two large detachable panels. Full armour protection is provided, and two 1,000 lb. bombs and four rocket projectiles, all carried beneath the wings, complete the Hornet's complement in this section.



The folded Sea Hornet wing. The main locking mechanism may be seen between the inboard spars and attention is drawn to the linkage between the folding jack and outer wing. Note also the two "flags" protruding above and below the wing at the front spar and indicating the withdrawal of the small mechanically operated locking pins.

THE D.H. HORNET

Manufacture of the Sea Hornet and all associated drawing-office work are the job of the Heston Aircraft Company. While this separation of parent and child is far from an ideal arrangement, good co-operation and understanding, particularly between the two design staffs, has enabled work to progress satisfactorily. Main units are sent dry-screwed as required, from Hatfield to Heston, where modification and final assembly take place.

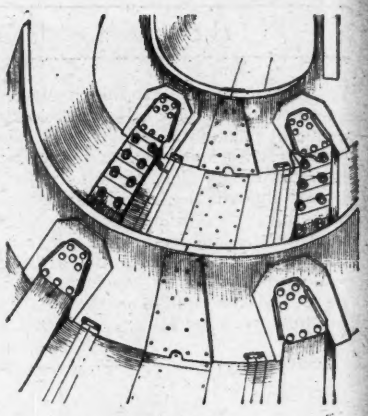
Navalising the Hornet

In addition to the folding wings, the Sea Hornet is equipped with arrester and accelerator gear, and these two call for major modifications to the fuselage unit.

A property of the normal Hornet wing is the even distribution of load throughout the frame members and skin. In direct contrast to this, the load for the folding wing must be concentrated at the hinge point and then redistributed through the outer and inner wing sections. This is achieved by increasing the number of spanwise stringers, particularly in the region of the front spar, by reinforcing the spar webs (this is inherent strengthening in view of the joint fittings) and by inserting sections of dural sheet between the plywood sheets of the top skin near the wing joint. This metal "belt" is actually inserted between the stringers, which are split horizontally to receive it. The sheets are Reduxed to the wood, and the separated part of the stringers replaced and scarf-jointed outboard of the alloy sheets. Bolts are then put through the reinforced skin in place of screws.

The number seven ribs of the original wing would lie at the folding point, but are removed in favour of two new reinforced metal ribs, 7 and 7a, which carry the joint fittings for their respective sections.

Two separate levers in the cockpit operate the folding mechanism. Small locking pins must first be withdrawn mechanically by moving one control; then the second brings the Lockheed hydraulic jacks into operation through a sequence valve, the main bolts being withdrawn first and the folding commencing afterwards. A small flag on each wing shows at once if the mechanical locks are withdrawn. The wings can be folded in five seconds or spread in twelve. They can be spread with a 1,000 lb. bomb in position, can be folded separately, and may be stopped at any position desired.

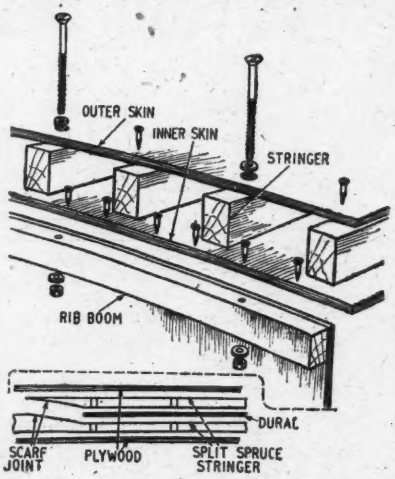


Inside the Sea Hornet fuselage, two modified bulkheads are seen, also part of the longeron reinforcements to which (on the outside) are bolted the arrester hook attachment fittings.

The arrester hook is attached at two points to the fuselage, and the fittings are bolted through to two heavy longerons ironically called "straights." These long curving laminated wood members reach forward to the lower rear wing-attachment fittings, which are of steel in place of the standard duralumin forgings. The hook attachment fittings are also screwed and Reduxed to the fuselage. The steel hook itself is coated with Colmony to withstand the sawing of the cable.

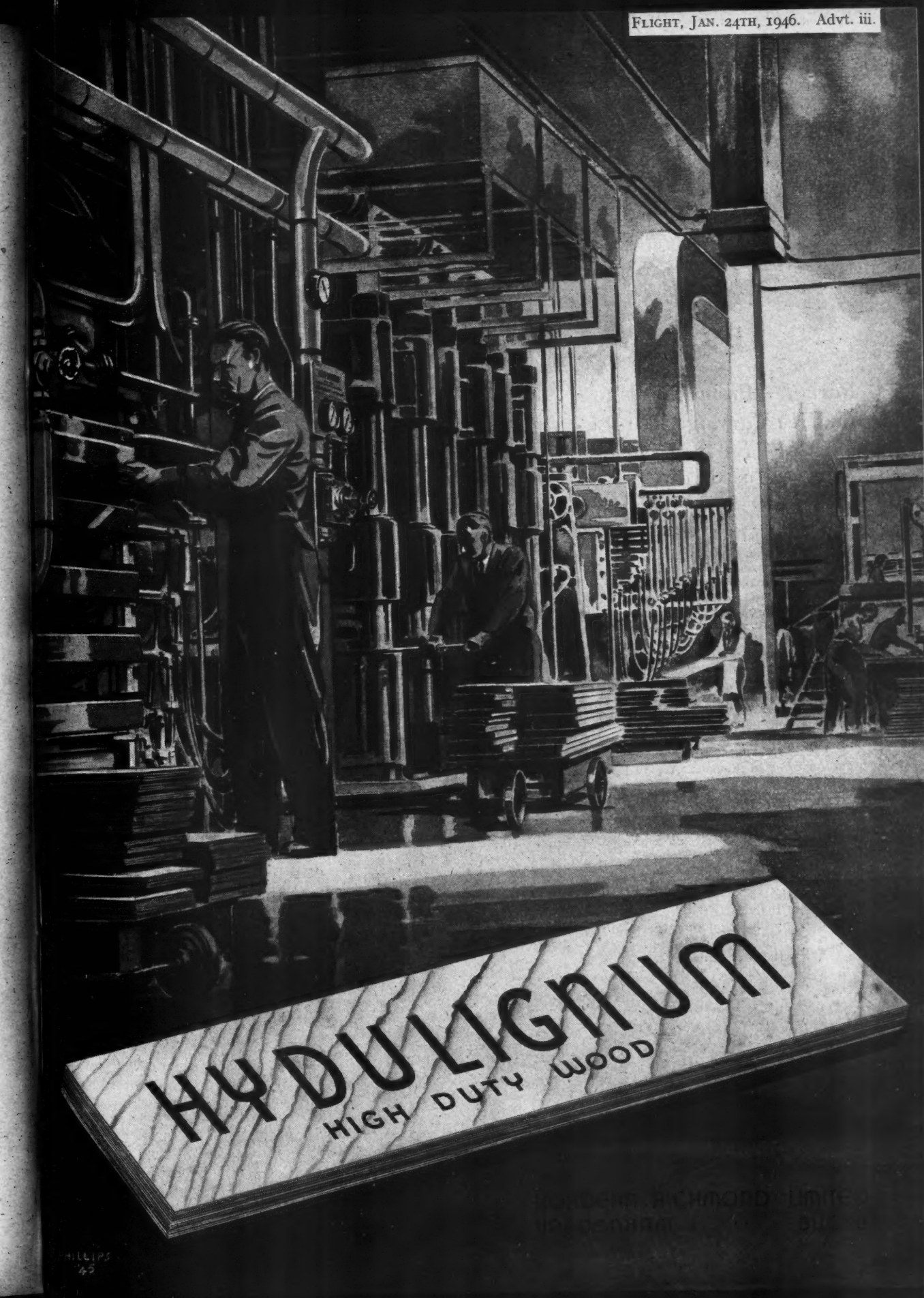
Three fittings comprise the accelerator attachments which can be used with twin, close-twin or American-type single-track equipment. Two large hooks are located below and bolted to the front-wing spars beside the attachment points, and the snap coupling is attached to lugs which are a part of a saddle-like addition to the tail-wheel compression leg. A modification which may be adopted on all Hornets is the provision for slinging, the pick-up points being on the inboard engine ribs.

It will be noticed that the external aerial on the Hornet appears to stretch from tail fin to cockpit enclosure. This is, in fact, true, but the wire passes through a small hole in the enclosure, through two small pulleys inside the top of it, and finally attaches to the armour plate behind the pilot's head.



(Top) In contrast to the normal wing top skin construction and attachment, inset is a section through the reinforced Sea Hornet skin showing the split stringer and the positioning of the alloy sheets.

The Sea Hornet with wings folded and arrester hook slung under the fuselage. The wing-folding modification has added 280 lb. to the total weight and the entire "navalising" including equipment, 550 lb.


HYDULIGNUM
HIGH DUTY WOOD

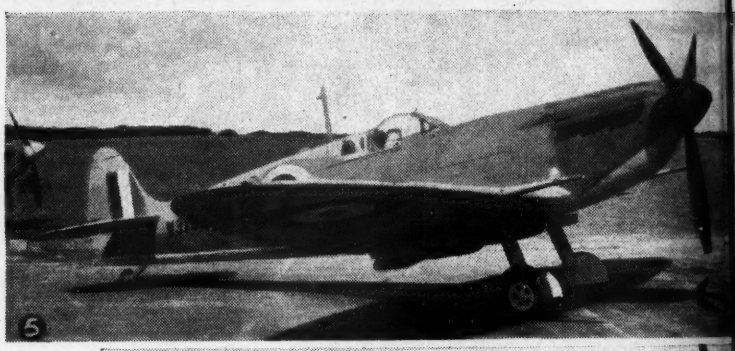
A SPITFIRE SCORE

Part I—From the I to the IX: Varying Characteristics: Early Troubles

By "INDICATOR"

WHEN someone asks brightly whether one has flown a Spitfire it is difficult, without risking an apparently outrageous line-shoot, to ask which of the score or so of marks is intended. But most of those who have flown one version of the Spitfire have also managed, at some time or another, to have handled at least a fair proportion of the other types. Each, though alike in appearance, is unmistakably individual both in feel and characteristics. Even before the arrival of the XIV and the XXI, with their radically changing mannerisms, to find oneself back in the seat of a I or II was almost to experience the sensation of riding with the Wright Brothers.

Yet that very first Spitfire was itself unlike anything one had previously handled, and was felt, at the time, to be the very last word in single-seat fighters. In comparison with other types of the period, it was quite incredibly "light" in every way, as well as being exceptionally fast—so fast that, on a cross-country flight, the maps were, so to speak, left behind, and one arrived at a destination at least ten minutes before any mentally calculated E.T.A. On my first flight weather conditions were, I remember, on the thick side, and I found that, from the driver's seat, the leading edge prevented any but the dimmest view of the ground. And,



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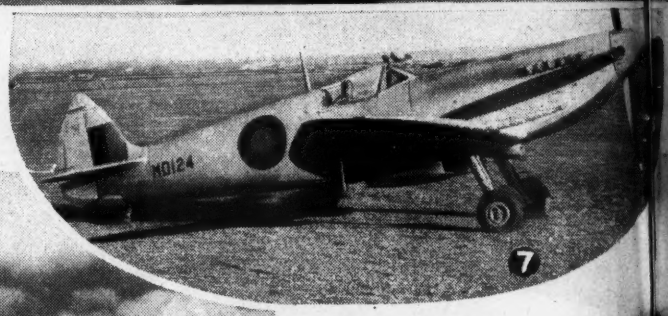

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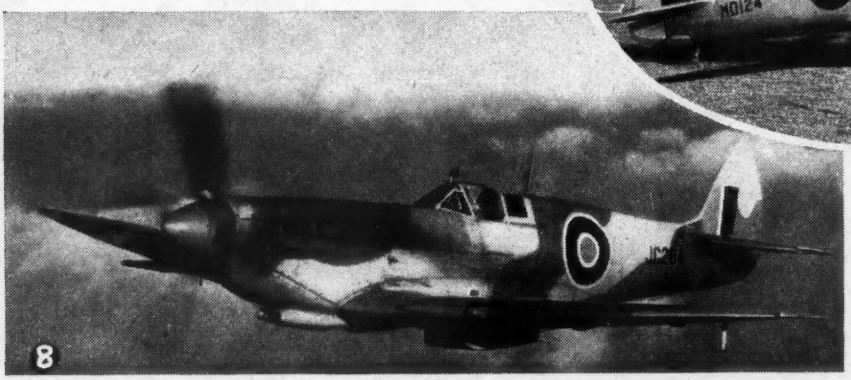
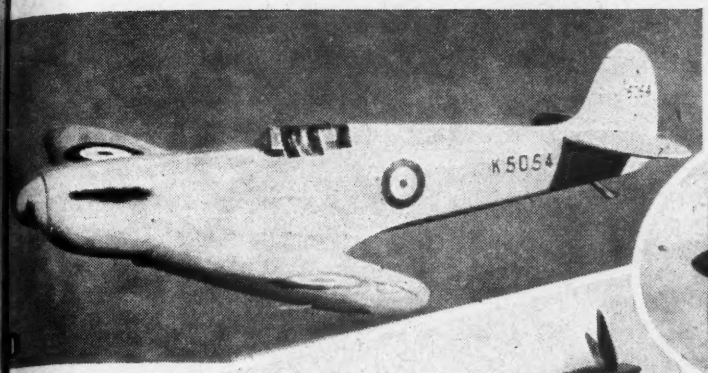
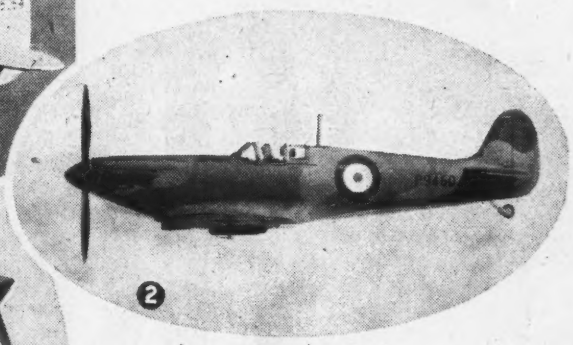


8

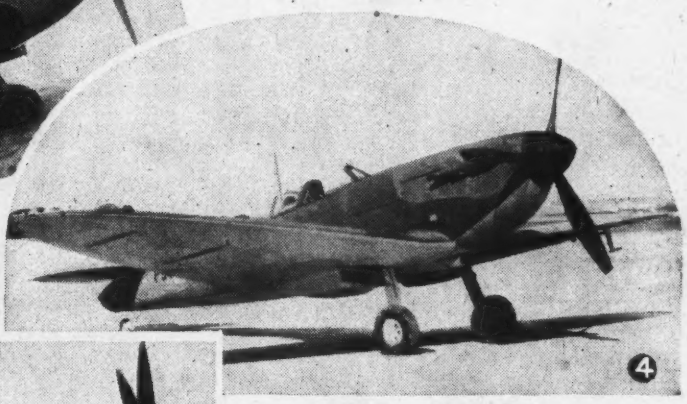
(7) Also with pressurised cabin for high altitudes, the Mark VII had a Merlin 61 engine with two-stage supercharger. (8) The Mark VIII Spitfire had a Merlin 66 engine and a rudder of greater aspect ratio. Its tail wheel retracted.



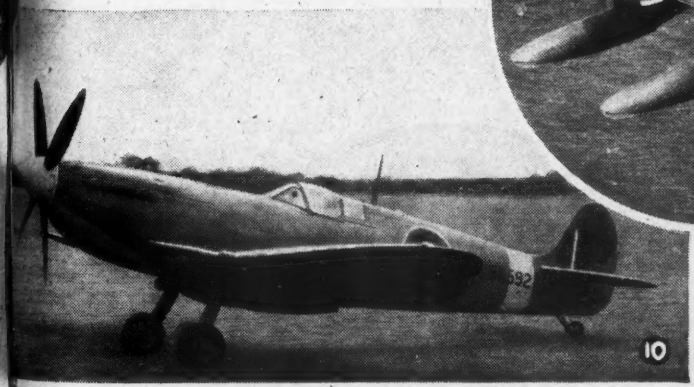
(1) The original prototype Spitfire which was painted pale blue and highly polished. (2) First production version, the Mark I was fitted with Merlin II or III engines.



(3) The famous Mark II 8-gun type which contributed such a big share in the Battle of Britain in 1940. (4) The unarmed Mark IV used for photo reconnaissance.



(5) The VB Spitfire had two 20mm. cannon and four 0.303in. machine guns to get through the German armour plate. (6) For high flying the Mark VI had a Merlin 47 and a pressurised cabin.



(9) and (10) Land and seaplane versions of the Mark IX. The Mark IX was sometimes fitted with two 0.5in. machine guns.

unused to the type and to later discoveries of ways and means of seeing ahead over or along the flat-topped engine cowling, the arrival was just an arrival and no more.

The original Spitfire had no engine-driven hydraulic pump and the undercarriage was operated by means of a long hand-pump on the right. Not only had one to change hands in order to select "up," after take-off, but while flying with the left hand, this pump had to be worked vigorously and, with no previous experience of the types very sensitive elevator control, departure was made in a series of fore-and-aft over-corrective pitchings. Later on, one learnt to be very ambidextrous and to be in good control of muscular reflexes, so that the inevitable "hunt" could be reduced to an amount which, at least, did not give one away to any watchers on the ground. With the early marks, too, the throttle damper was not very effective unless tightened with a pair of pliers, and the undercarriage pumping had occasionally to be given up while changing hands yet again in order to deal with the sudden

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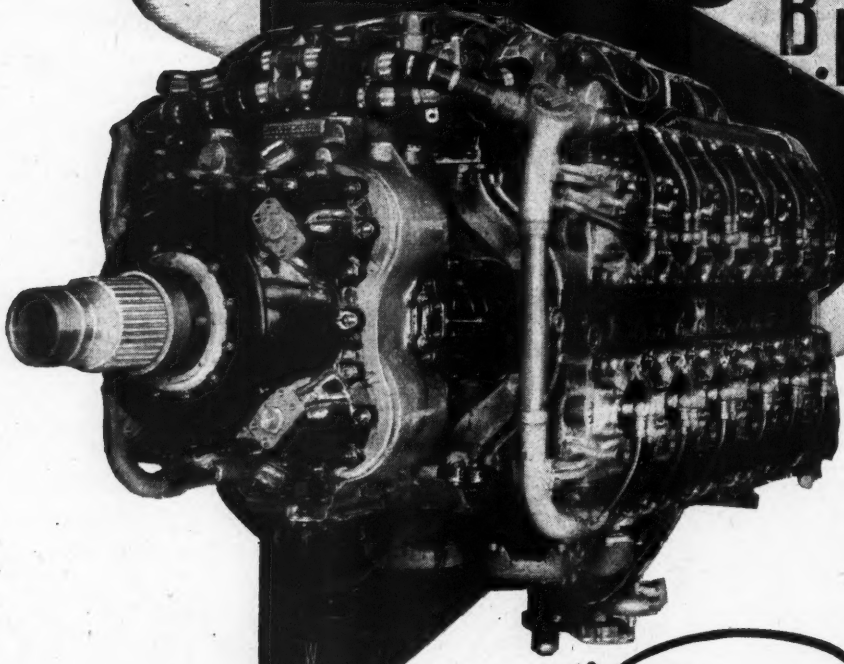


NAPIER "Sabre"

SERIES VII

D. NAPIER & SON LIMITED · LONDON · W.3

A SPITFIRE SCORE

extraordinary silence as the ivory-handled throttle vibrated quietly back. It is difficult now to remember that these early Spitfires, after the fixed-pitch period, had a two-pitch airscrew operated by a plunger-type dashboard control.

Another little difficulty which occurred with many of the early Spitfires concerned the way in which the undercarriage selector would occasionally jam irrevocably in the half-way position while selecting "down." For one reason or another the "up-lock" pins had become immovable, and it was necessary to take the weight off the retracted legs if any further lowering progress was to be made. Since, of course, the only way of doing this was to invert the aircraft, Spitfires might occasionally be seen on their backs during the circuit. An alternative method of freeing the selector was to push the nose down violently, while, at the same time, giving the lever a sharp tug.

In many ways, the most pleasing of all the Spitfires was a version of Mark V, with clipped wings and cropped blower. I am not sure whether, previous to general modification, the V was the first to have metal rather than fabric ailerons, but certainly these were extraordinarily light—and more so than any earlier or later marks, with the possible exception of the series of VIIIs. With the Spitfire V one also had the pleasure of obtaining an unprecedented 18 lb. of boost.

Cross-wind Landing

Although the Spitfire always appeared to be "underlegged" and should, by all the rules, have been difficult to handle while landing with such a comparatively narrow undercarriage, the entire situation was more than saved by the fact that control was so good right down to the stall. When landing across wind, therefore, the necessary degree of corrective drift could be applied and held to the last possible moment, and there was no real excuse for any ground looping. Experience at one small airfield where, even in the later stages of the war, there was only a single runway (and this nearly always out of wind) showed that the Spitfire would take almost anything in the way of a cross-wind unless carelessly put down with the drift unchecked. In fact, the entire performance soon became quite instinctive, and it was impossible to explain exactly the action which was being taken during the final hold-off seconds. Only after the landing was it necessary to take a smart handful of brake lever to prevent the aircraft swinging into wind.

Intermediate and not very well-known marks were the pressurised VI and VII. In one version the cockpit lid was, so to speak, "built" over the pilot before running up, and there were four inside clamping levers to be reached and locked. The most back-breaking contortions were required in a very confined space while these locks were pushed home with claustrophobically palsied hands. Thereafter it was not possible to open the hood without actually jettisoning the whole outfit. Other variants had a sliding canopy, but, for some curious aerodynamic reason, these, when opened, caused a tail burble; and in order to avoid the shudderings one was inclined, even with this type, to arrive with the hood shut. Both these aircraft were strangely unlike the others. The whine of the cabin blower, and the way in which a deep silence descended, cutting one off from the outside world, as the cabin sealing was applied; the pointed wing tips; and the mechanical stiffness of the ailerons as the cables passed through airtight conduits—all these made up the strangeness.

Eights and Nines

I believe that the majority of the VIIIs were shipped to the Far East, but, in any case, production was necessarily on a smaller scale than that of the IX—though the former was in many ways a more advanced version, coming as it did from the "home" factory. It had a retractable tail-wheel and was, I believe, the first to be fitted with the higher aspect ratio rudder and interconnected throttle and airscrew control. There were two major varieties, one with a Merlin 66 and the other with a Merlin 70 for low and high level operations—or, perhaps one should say, for "high and higher" operations respectively.

Each VIII on test from the factory was taken to full-throttle height in "M" gear and to automatic blower-change height before being brought down again for level-speed and diving tests, which were carried out in all kinds of strange conditions; on one occasion I was still in cloud at 20,000ft. We had a trick by which, in overcast circumstances and without radio aid, we could always guarantee to return to a point within a few miles of the airfield. Climbing up into wind at the correct speed of 170 m.p.h. and at rated boost, we would turn down wind for the speed check, and round again for the dive, the end of which should, in theory, have brought us back again over the airfield. Of course, there were often delays of different kinds during the test and, after breaking cloud, perhaps over a totally unknown landscape, it was quite an exercise in rule-of-thumb navigation to find one's way back home. Often we were quite near, but didn't know it. Maps, though useful as a means of giving confidence, were not really of great value since, in order to find one's way from A to B, it is necessary, first of all, to know where A happens to be—and that was something which we didn't always know.

(To be concluded)

"WORM'S EYE VIEW"

SINCE there are all types of humanity in the Services, a play dealing with some phase of Service life gives the author a free hand in type selection and plenty of scope for variety. This is particularly useful in the case of comedy, and R. F. Delderfield's play now running at the Whitehall Theatre, London, demonstrates the point in most entertaining fashion.

Its title of "Worm's Eye View" is probably capable of more than one interpretation, but this light-hearted story of the adventures (and misadventures) of five R.A.F. "other ranks" billeted on a north-country seaside landlady of the grimmer species is both well constructed and well presented. The various characters are recognisably life-like, the situations highly amusing and the dialogue brisk.

The pace is a bit leisurely in the first scene (there are two scenes in the first and third acts and three in the second) but with the arrival of aircraftman Porter things really begin to happen. Ronald Shiner (who also produces) gives a delightful study of this Cockney recruit who brings with him the atmosphere—and some of the actual stock—of his stall in Petticoat Lane. His is the outstanding performance in an outstanding comedy part, but every member of the cast of eleven merits commendation did space permit.

Most of the fun springs from the benevolent aid given by Pop (Jack Hobbs), the middle-aged L/AC., in furthering the romance between the young corporal (John Varley) and the extremely naïve daughter of the house (charmingly played by Diana Dawson). This reaches a riotous climax—and provides a terrific curtain—in the second act, when the landlady's son, a thoroughly ropey type of corporation official, played with convincing venom by Christopher Banks, gets what is coming to him.

Those who feel that a good laugh might help them to forget the peace for an afternoon will find this play just the thing.

ACCENTUATING THE EXPERIMENTAL

EMPLOYING some 2,000,000 persons at its wartime peak, the American aircraft industry, by a series of "cut-backs" beginning in 1944, had only about 150,000 employees on its payrolls at the end of 1945. This, however, is generally believed to be "the bottom of the curve," although the figure is not expected to increase greatly during 1946; the best estimates are that it will not exceed 200,000.

These figures are contained in some notes issued by the Aircraft Industries Association of America, Inc., but the most striking statement of all is that "nearly half" of the industry's 200,000 personnel "will be highly skilled engineers engaged on experimental work."

The importance of the experimental work was emphasised in a joint statement by Donald W. Douglas, then chairman, and Eugene E. Wilson, new chairman of the A.I.A.

ROLLS-ROYCE MERLIN 13

WITH the advent of the new Series 130 it can truthfully be said that the Merlin has carried progressive development of a basic type farther than any other aircraft engine in the world, for within a period of ten years (the first Merlin was produced in 1936), not only has its power output been increased from less than 1,000 to more than 2,000 b.h.p., but, in addition, more Merlins have been built than any other type.

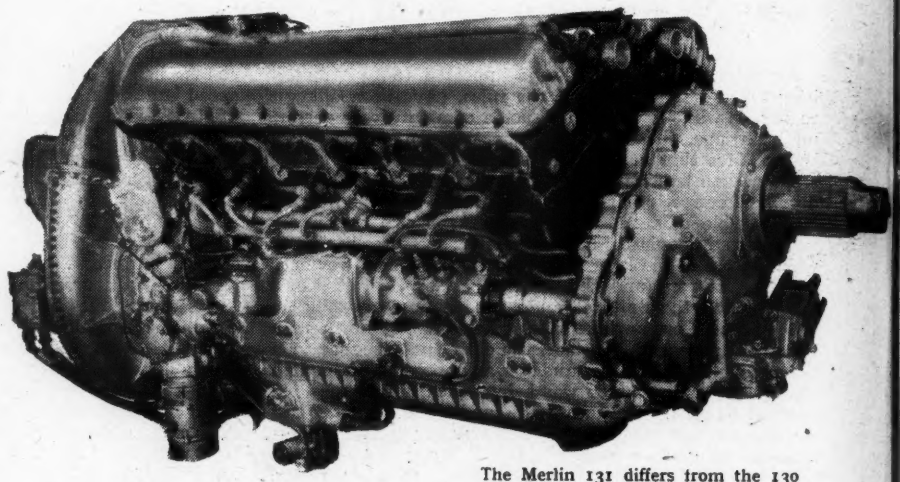
The Merlin 130 and 131 are specially developed variants of the Series 100 engines, and have been specifically prepared for installation in the de Havilland Hornet, which is the first twin-engined British aircraft to have handed airscrews. This feature accounts for the designation 130 and 131, the former being a right-hand tractor unit for the port side, and the latter a left-hand tractor for the starboard nacelle. As the airscrew on the 130 rotates in the opposite direction to that of the 131, it might at first sight appear that this would involve considerable complication, and that it would be necessary for the crankshaft to rotate in the opposite direction—making the engine "handed" throughout. This, however, is not the case; all that is necessary on a liquid-cooled, in-line engine employing a single spur reduction gear is the introduction of an idler wheel between the driving pinion and the main gear wheel. The advantage of this simple modification, which is clearly shown in an illustration, is that the two engines have 95 per cent. of spares in common, and to alter the engine from one "hand" to the other, it is only necessary to change the reduction gear; the weight increase with the additional gear and bearings is practically negligible and can be discounted.

Although the Merlin 100s were the first of a new series of two-stage, two-speed, inter-cooled types incorporating many improved features, the series 130 and 131 have further new features which enable an improved installation to be effected for fighter aircraft. In fact, it would not be inapt to describe this latest Merlin as being "tailored" to suit the particular installation; this has resulted in a very low frontal area per b.h.p. An illustration gives a curve of interesting comparisons of frontal-area: power, starting with the Eagle produced at the beginning of the first World War and ending with the Merlin 130 of to-day. From this curve it will be seen that a steady increase in power per square foot of frontal area was achieved during the inter-war years, every four years producing an increase of roughly 25 b.h.p./sq. ft., until 1936, and then, with the advent of the Merlin, there was a considerable improvement amounting progressively to 60 b.h.p./sq. ft. in 1940; 100 b.h.p./sq. ft. between 1940 and 1944, until in 1945 the amazing figure of 340 b.h.p./sq. ft. was achieved with the Merlin 100s.

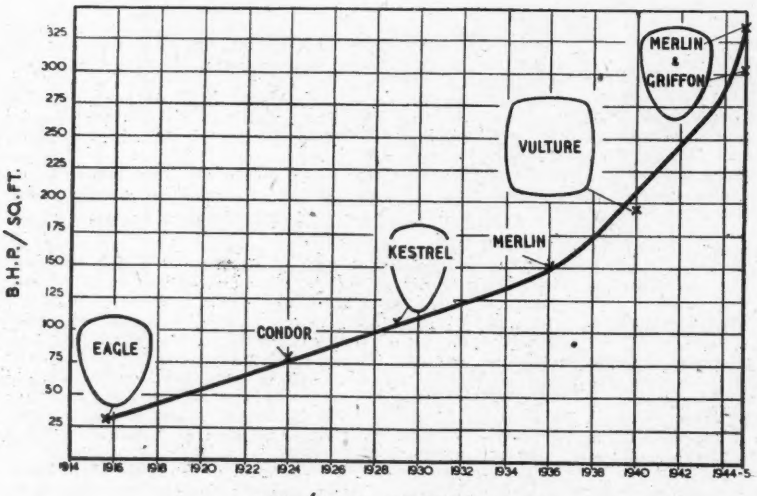
History of Collaboration

The Hornet is a good example of the excellence which can be obtained when close collaboration exists between the aircraft designer and the engine manufacturer, although sound basic design must obviously be the foundation if extensive developments are planned. In this connection, when the design for the Mosquito was laid down in 1939/40, the decision was taken to use Merlin 20s, as they were then sufficiently advanced in design and development to ensure that the Mosquito would have a superior performance to that of any equivalent enemy aircraft. Further, it was predicted by Rolls-Royce that the Merlin 20 would be capable of much greater development, and this would ensure the initial superiority being retained over a period of years.

Even the most casual survey of the Mosquito's record is sufficient to illustrate how well this long-term planning has succeeded, and it is sufficient to

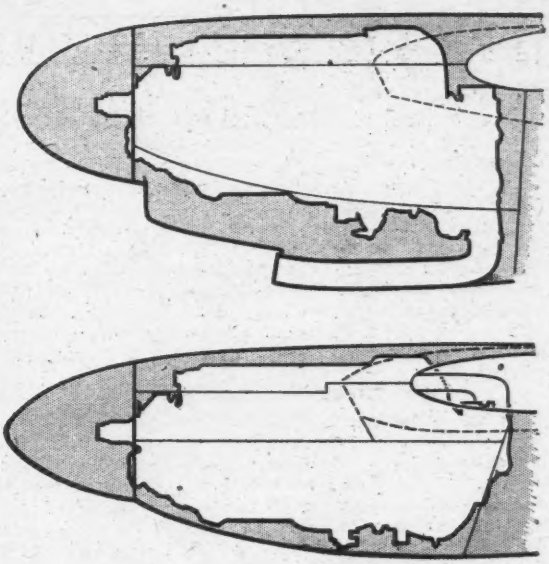


The Merlin 131 differs from the 130 only in that an idler wheel is interposed between the driving pinion and the main gear wheel.



130 SERIES

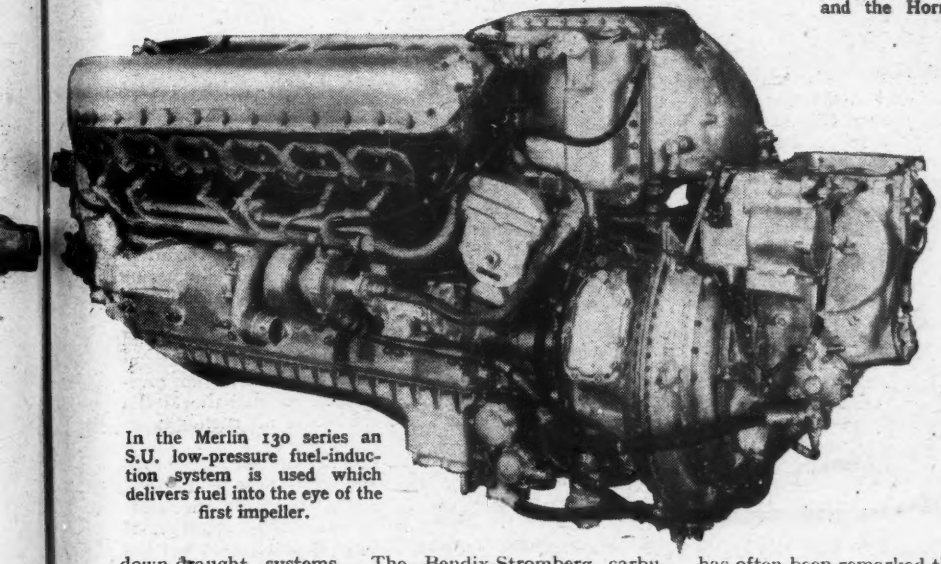
"Tailor-Made" Power Unit with Handed Reduction Gears for the de Havilland Hornet



Drag still further reduced. The Mosquito (upper) and the Hornet (lower) Merlin installations compared.

say that the Merlin 130 and 131 were chosen for the Hornet for precisely the same reasons. The tabulation of power outputs shows that the Merlin 130 develops a maximum of 2,030 b.h.p. at 1,250ft., but we have the maker's authority for saying that powers in excess of 2,600 b.h.p. have been recorded on the test beds at Derby—a specific power of no less than 96.3 b.h.p./litre.

The Hornet Merlin installation probably represents the first attempt to design a production engine into a power plant in contradistinction to designing the power plant round the engine. To eliminate the air scoop as used on the Mosquito, ducted air intakes are faired into the leading edges of the wing outboard of the engines on the Hornet, and the 130 and 131 are the first Merlins to incorporate down-draught systems. The Bendix-Stromberg carburettor hitherto used on the Merlin is now replaced on the 130 and 131 by an S.U. low-pressure fuel-injection system, which delivers through a nozzle into the eye of the first impeller and provides extremely accurate fuel metering whilst having a high standard of mechanical efficiency.



In the Merlin 130 series an S.U. low-pressure fuel-induction system is used which delivers fuel into the eye of the first impeller.

High Continuous Powers

Considering all that has been accomplished with the amazing Merlin, it is no surprise to learn that the Hornet has a maximum performance which is only exceeded by the very latest jet-propelled fighters. In level flight, speeds of more than 470 m.p.h. have been achieved, and a rate of climb of 4,000ft./min. has been recorded. At a maximum *continuous* climbing boost of 12 lb./sq. in., over 1,300 b.h.p. is obtained at 23,000ft.: a remarkable performance when it is remembered that the 130 and 131 are of the same capacity as the original Merlin II.

Cruising powers of more than 1,100 b.h.p. are available to over 20,000ft., and, although cruising speeds have not yet been measured on the Hornet, it is known that the North American Mustang with Merlin engines of approximately similar power has a maximum cruise rating of 420 m.p.h., and it is expected that the Hornet will improve on this figure by a quite considerable margin. The high-performance figures are largely due to the intensive research and development work on supercharging undertaken by Rolls-Royce, coupled with continuous experimental testing to ensure mechanical reliability — it says a great deal for the reliability of the engine that a boost pressure of 12 lb./sq. in. is permitted for continuous climbing.

Whilst on the subject of supercharging, it might not be out of place to correct a popular misconception about the respective merits of the turbo-supercharger as against the two-speed, two-stage centrifugal supercharger used on Rolls-Royce engines. It has often been remarked that most American fighters, such as the Lightning and the Thunderbolt, have exhaust turbo-superchargers, and that, by utilising the energy of the exhaust gases, they have established an advantage over the mechanical form of supercharger drive. It is not generally realised, however, that, on our high-performance fighters, a well-designed multi-ejector exhaust system results in a considerable augmentation of thrust, which would be lost if turbo-superchargers were employed. On the Hornet there is actually an increase in thrust equivalent to 450 b.h.p./engine at full-throttle height.

The principle of the Rolls-Royce multi-ejector exhaust system is just the same as jet reaction with a gas-turbine,

R-R MERLIN 130 SERIES

	Performance				
	Gear	B.H.P.	R.P.M.	Boost lb/sq. in.	Altitude ft.
Max. T-O power ...	M.S.	1,670	3,000	18	S.L.
Max. Combat power ...	M.S.	2,030	3,000	25	1,250
" " " ...	F.S.	1,890	3,000	25	13,750
Max. Climbing power ...	M.S.	1,420	2,850	12	11,000
" " " ...	F.S.	1,350	2,850	12	22,000
Max. cruising power ...	M.S.	1,205	2,650	9	11,000
" " " ...	F.S.	1,190	2,850	9	25,000

ROLLS-ROYCE MERLIN 130 SERIES

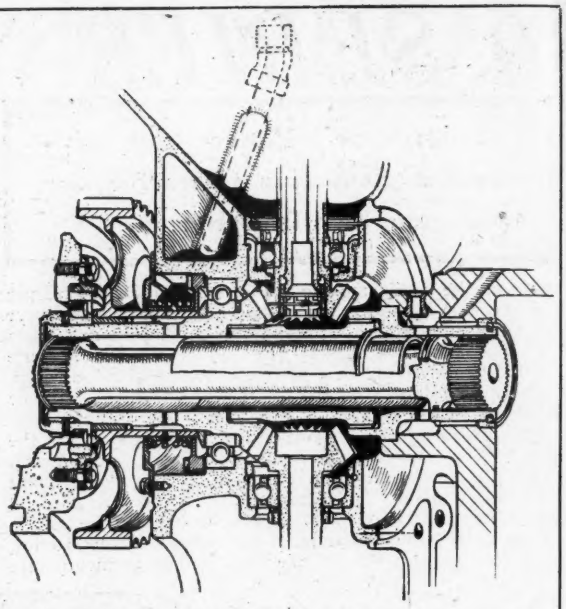
but the intermittent nature of the ejection from the individual exhaust stacks results in a higher thrust than that obtained from a comparable steady stream.

As the engines of the 100 Series operate at higher ratings than any previous Merlin engine, a target of 100 hours' continuous running at maximum r.p.m. and plus 18 lb. boost was aimed at to ensure 100 per cent. reliability. It is worthy of note that in flight the maximum duration for these conditions is five minutes! To eliminate the slightest weaknesses that might be revealed, a programme of development was initiated which culminated in the successful completion of the 100 hours' continuous running at the conditions stipulated before the engines were passed for production.

Results of Testing

As was to be expected, rigorous testing of this nature indicated points which could usefully be strengthened without unduly adding to weight. The crankcase panels supporting the main bearings have therefore been thickened, and extended bosses for the cylinder block and main bearing studs have been incorporated. Additionally, the cylinder head has been reinforced, and, by a repositioning of the core-plugs, a reduction in stress concentration has also been brought about. By virtue of the higher boost ratings, the differential pressure across the valves at high altitudes is considerably increased, and the valve springs are, therefore, of increased load capacity.

Refinements introduced include a double-flanged outer-race to the bearing at the forward end of the rotor shaft, secured in position by bolts. This unusual type of bearing proved to be more reliable than the normal bearing, and it permitted an increase in capacity in the space available. A redesigned spring-drive is also incorporated, with an outer member completely independent of crankshaft deflections. The coolant pump has been brought into line with Griffon practice and has a spindle mounted on ball-bearings lubricated from the low-pressure oil system. Service maintenance is eliminated by the employment of a packless-gland coolant seal having a carbon ring on the pump spindle.



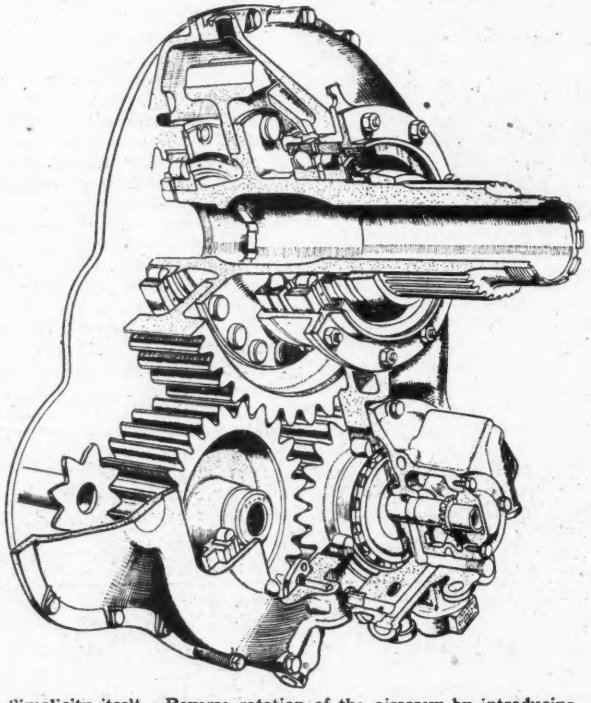
The modified spring-drive shaft with the outer member completely independent of crankshaft deflections.

Supercharger efficiency is raised by moving the rear bearing of the first-stage rotor from the suction side to the delivery side. This leaves the suction side free from restriction, and results in a better mass airflow with reduced turbulence. Further improvement is effected by the adoption of the S.U. fuel-injection system, this eliminating pressure losses occasioned by the restriction of venturi tubes as used with suction carburettors. The cumulative effect of these modifications is an increase in rated altitude of 2,500ft. It was undoubtedly the continuous progressive improvement in supercharging which enabled the Merlin to maintain its superiority over all enemy types throughout the war.

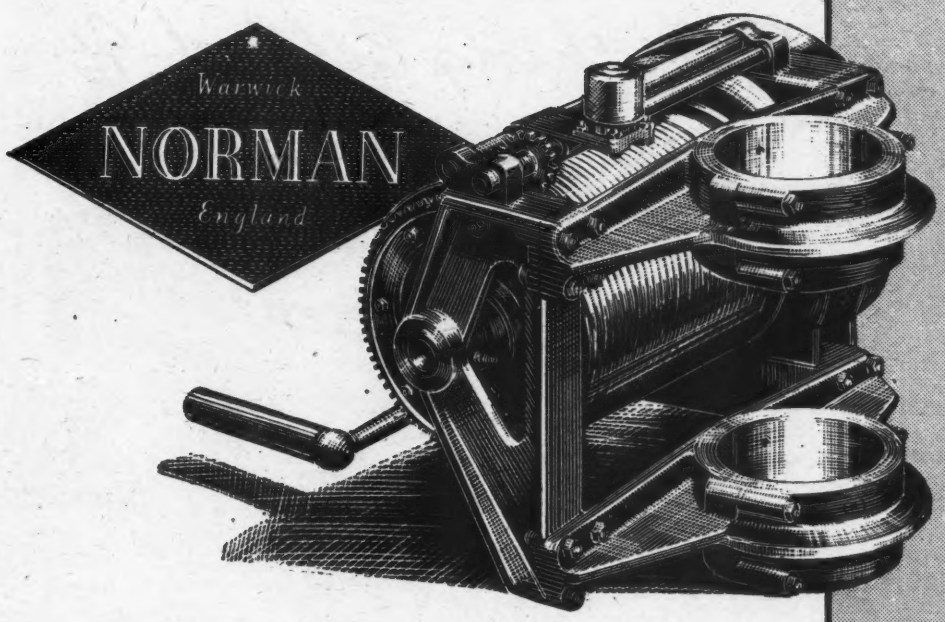
The fuel-injection system comprises a gear-type pump supplying fuel to a five-plunger pump operated by a swash-plate, the stroke and the capacity of the pump being varied by alteration of the angle at which the swash-plate operates; the latter assumes a mean position after compensating for all the variables determining fuel demand. Variation in pump capacity, by varying the stroke, is governed by a "Z" shaft and rocking levers linked to an oil-operated servo-piston; this shortens the stroke, and a second piston subject to boost pressure lengthens it, a balance between these two forces being established by a small leak valve. The sensitive portion of the valve is controlled by a capsule subject to boost on the outside, temperature on the inside, and exhaust back pressure on the end convolution. As with all positive displacement pumps, elimination of air is essential, and a de-aerator is therefore interposed between the delivery side of the gear pump and the suction side of the plunger pump. By this means all air is extracted before the fuel enters the plunger pump, and accurate metering is thus assured.

Owing to production commitments during the greater part of the war it was not possible to incorporate the axial flow system of lubrication on Merlin engines before the introduction of the

(*Concluded at foot of page* 96.)



Simplicity itself. Reverse rotation of the airscrew by introducing an idler wheel in the reduction-gear casing.



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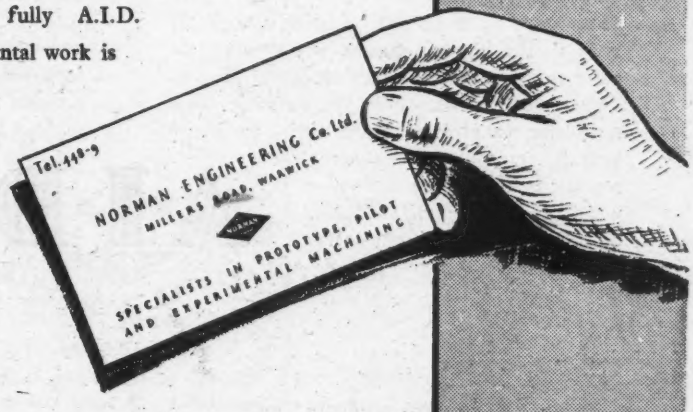

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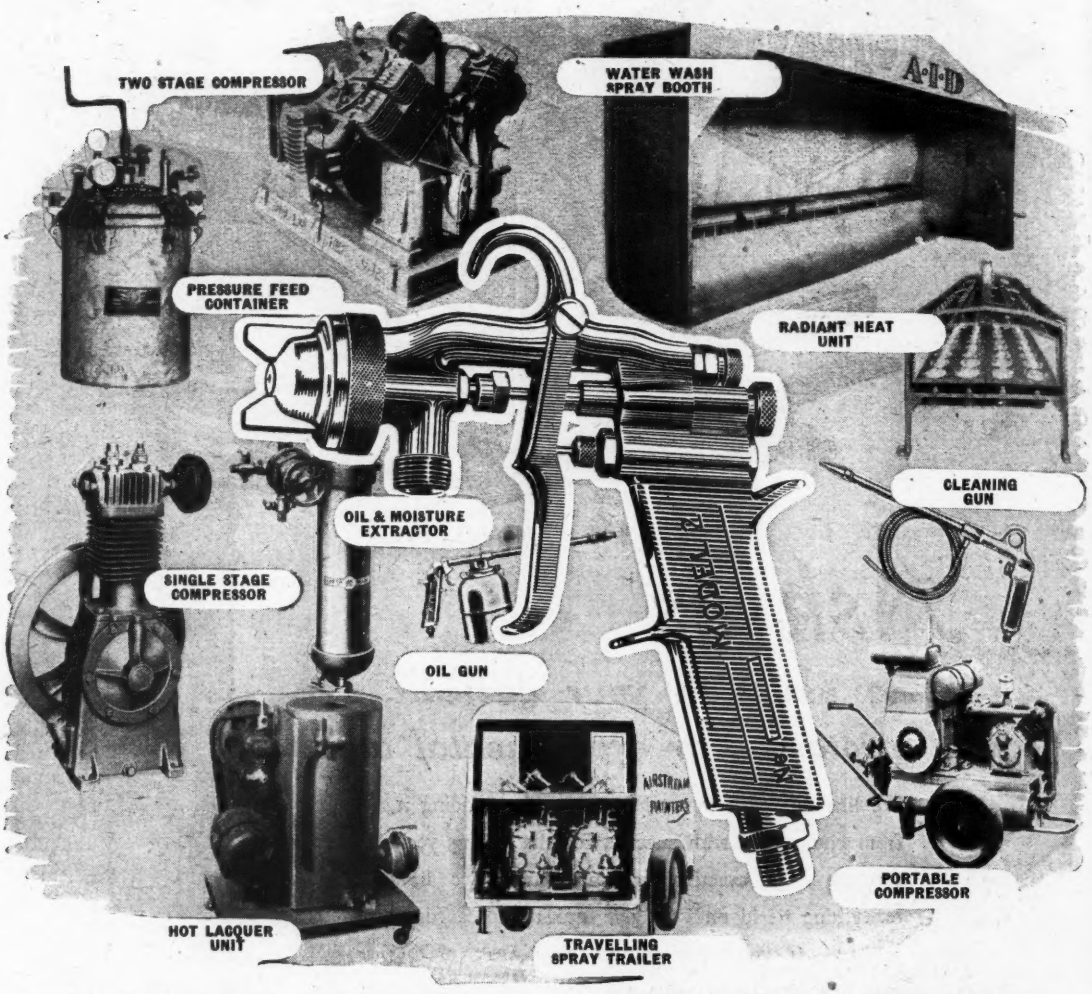

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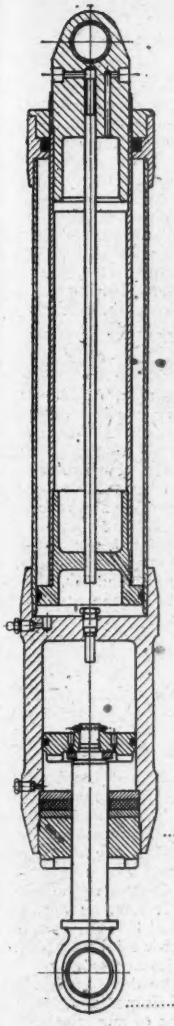
Scientific A 12A

Liquid Springing

New Device Proves That Liquids Can be Compressed



Combined spring unit and actuating jack for Tudor I and II tailwheels whereby the spring is automatically topped-up with each retraction.

THE postulate that liquids are incompressible has in the past been true only to a limited extent; that is to say it has been known that one can, in fact, compress a liquid by applying sufficient compressive force. Hitherto, however, the difficulty has been to make such compressibility worth while commercially. Dowty Equipment, Ltd., have now demonstrated that liquids can be compressed to a quite considerable extent, and that this fact can be turned to very practical use.

Many applications of the new device are obviously possible. In aircraft the springing of main-wheels and tail-wheels is the natural field for the Dowty invention, especially in view of the fact that a very considerable saving in weight is achieved by the use of the liquid spring. This consists essentially of a steel cylinder containing a piston and rod, the latter passing through a high-pressure gland. The piston is not a pressure head as we normally know a piston; it serves to divide the cylinder into two compartments, communication between which is by means of a clack-valve and orifices in the piston.

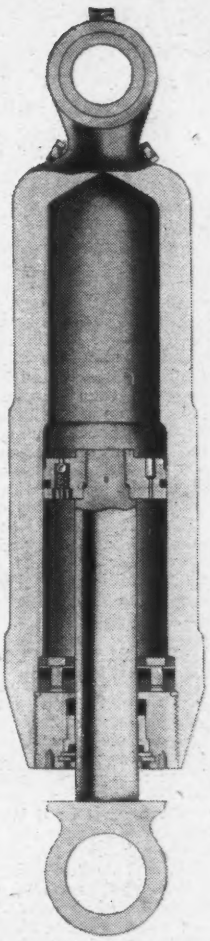
The cylinder is completely filled with oil to the exclusion of all air. When a load is applied, the piston and rod are forced into the cylinder, and the decreased capacity available for the oil owing to the volume displaced inside the cylinder by the rod induces compression of the oil.

Comparison between a normal metal coil spring and a Dowty liquid spring, each for a full compressive load of 20 tons at a maximum deflection of 4 in., serves to illustrate the advantages that may be obtained from use of the latter apart from its springing and shock-absorption qualities. The metal spring is 14½ in. long × 7¾ in. dia. and weighs about 77 lb.; against this, the liquid spring is 14¾ in. long × 2½ in. dia. and weighs approximately 11 lb.

Double Action

The springing characteristics of the unit make available a very high degree of resilience, and whilst on the power stroke the flow of oil through the piston is relatively free, on the return stroke the clack-valve closes and the reverse flow of oil is restricted to that allowed to pass through the orifices. Thus a degree of damping is built-in and this can be regulated for particular requirements by varying the diameter of the orifices, within limits, irrespective of the springing characteristics. From the foregoing it will be appreciated that this device incorporates springing and shock-absorption media in the single unit.

Aside from the inherently novel nature of the liquid spring, the most interesting single aspect of the device is centred on the ingenious high-pressure gland. This is of the unsupported area type and is housed between a shoulder in the cylinder bore and the gland retaining nut. A steel pressure plate carrying four dowels butts against the shoulder, the dowel pins passing through a resilient gland ring into holes in a backing plate, which is supported by the retaining nut; a mesh disc separates the gland and pressure plate to prevent a pressure lock. In essence, as the area of the gland is less than that of the pressure plate, due to the four dowel holes, oil pressure on the plate is magnified on the gland so that the gland tends to leak past the rod into the cylinder rather than the oil leak out.



Section showing high-pressure gland, clack-valve and orifice in piston.

It has been established that the liquid spring requires very little maintenance, but for topping-up two tiller plugs are provided whereby oil may be introduced without air. Probably no better tribute could be given the liquid spring than that a set fitted to a Halifax survived two crash landings and was then subjected to 500 landings without receiving attention of any kind.

Further to eliminate topping-up, the arrangement devised for the tailwheels of the Avro Tudor I and II embraces a liquid spring directly connected through a non-return valve to one side of the tailwheel retracting jack. Thus each time the tailwheel is retracted the liquid spring can be topped-up—that is, supposing any topping-up is required; if not, the non-return valve will not open.

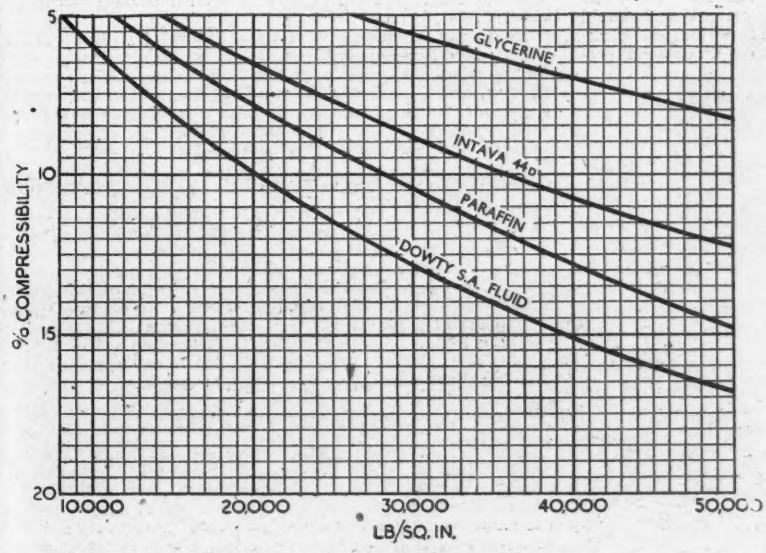


Diagram showing curves of percentage compressibility against pressure for four different liquids.

FROM ALL QUARTERS

ARIES BREAKS CAPE RECORD

TAKING off from Thorney Island, near Portsmouth, at 3.58 a.m. G.M.T. on Wednesday, January 16th, the Avro Lancaster, *Aries*, captained by Wing Cdr. C. M. Dunnicliffe, D.S.O., D.F.C., and navigated by Capt. M. H. Short, S.A.A.F., landed at Brooklyn airfield, Capetown, at 12.19 p.m. G.M.T. the next day, thus covering 6,900 miles in 32hr. 21min., including a 40min. stop at Cairo for refuelling.

This flight lowered the record from England to the Cape by 7hr. 4min., the previous best time having been set up by Alec Henshaw in February, 1939, when he flew from Gravesend to Capetown in 39hr. 25min. in a Percival Mew Gull.

The *Aries*, which first achieved public fame on the Polar flights of May last, although she had made a round-the-world flight in October and November, 1944, belongs to the Empire Air Navigation School at Shawbury, Shropshire. She had flown more than 100,000 miles before she set out on her present trip, which is a routine mission in charge of Air Cdre. N. H. D'Aeth, for training and liaison with Dominion air forces. This fact was stressed by Air Cdre. D'Aeth on arrival at Capetown, where he told Press representatives gathered on the airfield that the breaking of the record was "purely incidental."

The aircraft is fitted with the latest types of radar and navigational equipment, and demonstrations will be given to South African air personnel before the return to Shawbury next month. Other special equipment is connected with experiments being carried out in the feeding of crews on military aircraft during long flights.

TRIBUTES TO SIR MAURICE DENNY

THERE was a somewhat attenuated attendance at the informal lunch given by the Air Registration Board in London last week to Sir Maurice Denny on his retirement from the chairmanship of the board. As we recorded in our issue of January 10, the chairmanship is being taken over by Lord Brabazon of Tara. Unfortunately, he was suffering from bronchitis and could not be present. Major R. H. Thornton explained that Lord Winster, Lord Knollys and Sir Frederick Handley Page were also prevented, and that as a result he was saying a few words about the departing chairman.

Major Thornton recalled that Sir Maurice began (before the A.R.B. was founded) by what he called looking into the seaworthiness of aircraft. He had, as chairman, done very valuable work, and the high standards reached by the board were very largely due to Sir Maurice, who rose above departmental wrangles and held a steadfast course in guiding the board.

Mr. Ivor Thomas, in the absence of his chief, Lord Winster, and the Director-General, Sir William Hildred (in Bermuda), also paid a tribute to Sir Maurice Denny and said the department valued the work of the A.R.B. very highly. Its set-up was typically British. It had just grown, like Topsy, but had done its work better than any deliberately planned body could have done. At present the board saw to certificates of airworthiness for aircraft and granted licences to ground personnel, but the time might come when it would grant airworthiness certificates to Ministers. He concluded by expressing his pleasure that Sir Maurice, although he had resigned the chairmanship, would remain a member of the board.

Sir Maurice admitted that after he joined the board he soon came to realise that he knew nothing about aircraft. Through his connection with shipping he did know something about classification, but the design and construction of aircraft was much more difficult. He felt that the chairman should be a more "local" man than he had been, who had to travel hundreds of miles to attend meetings, and in that respect Lord Brabazon would have a great advantage. During his nine years with the board he did not think he had made any enemies, but he had certainly made many friends.

Rolls-Royce Merlin 130 Series

(Continued from page 94)

Merlin 100 Series. This method of lubrication, whereby the oil is supplied at each end of the crankshaft, ensures a positive oil feed to the big-end bearings as well as the main bearings, and gives greater bearing area without increase in journal width or diameter. Other features of the new oil system are air separators and sludge traps located in No. 1 and No. 7 crankshaft journals. The separators improve the lubrication under aerobatic conditions by ensuring that any air which may have entered the system is purged so that there is no interruption of the oil flow for dangerously long periods. The sludge traps ensure a grit- and sludge-free flow of oil to critical points and thereby increase the life of the bearings.

The Merlin engine is probably the most compact and versatile power unit that has ever been devised, and in its tenth year remains incomparable. No other engine in the history of aviation has such a record of proved reliability and service, and by this token it is not in the least surprising that within the short space of six months it has already obtained a similar reputation in post-war civil aviation.

A PIONEER PASSES

WITH the death, shortly before Christmas, of Mr. D. J. Mooney, the British aircraft industry has lost one of its pioneers in metal construction. He began work during the first world war, and from 1917 to 1927 he fought an uphill battle. Metal construction presented many new problems in those days, and the general scheme was to substitute steel components of the same geometrical proportions as the wooden components which they were to replace.

Mr. Mooney, after some years of experimentation, realised that he needed a really skilled technical man. He called in Mr. Donald Emby, whose technical ability enabled Mr. Mooney to make a success of the work undertaken by the Steel Wing Company. This was ultimately absorbed by the Gloster Aircraft Co., Ltd., who manufactured what was then considered large quantities of metal components, notably wing spars, for the Westland Wapiti. The tenacity of Mr. D. J. Mooney undoubtedly played an important part in the difficult transition period from wood to metal construction.

A "JET-PROP" AMBASSADOR?

THE possibility of powering the Airspeed Ambassador (AS-57) with gas-turbine engines was mentioned by Mr. Alan S. Butler, chairman of Airspeed, Ltd., when he presided at the company's 12th ordinary general meeting last week.

Dealing with this aircraft (fully described in *Flight*, October 25, 1945) Mr. Butler said that the fitting of two or four gas-turbine engines in place of two Bristol Centaurus had been considered and met in the initial design; it was, in fact, considered essential that the Ambassador should be easily adapted to the installation of turbine-driven airscrews in view of the simplicity of this type of power unit and its accessories.

"The close touch," he added, "with the development and possibilities of the gas turbine—of vital importance to the aircraft designer—which we enjoy by reason of our relationship with the de Havilland Engine Co., is an important advantage to us."

Reviewing Airspeed's wartime activities, Mr. Butler mentioned two experimental aircraft—a four-engined type with folding wings for carrier operation built to an Admiralty specification, and a single-engined trainer. Two of the former were built, but changing war circumstances removed the operational need for the type, while the Commonwealth Air Training Plan rendered the new trainer also unnecessary.

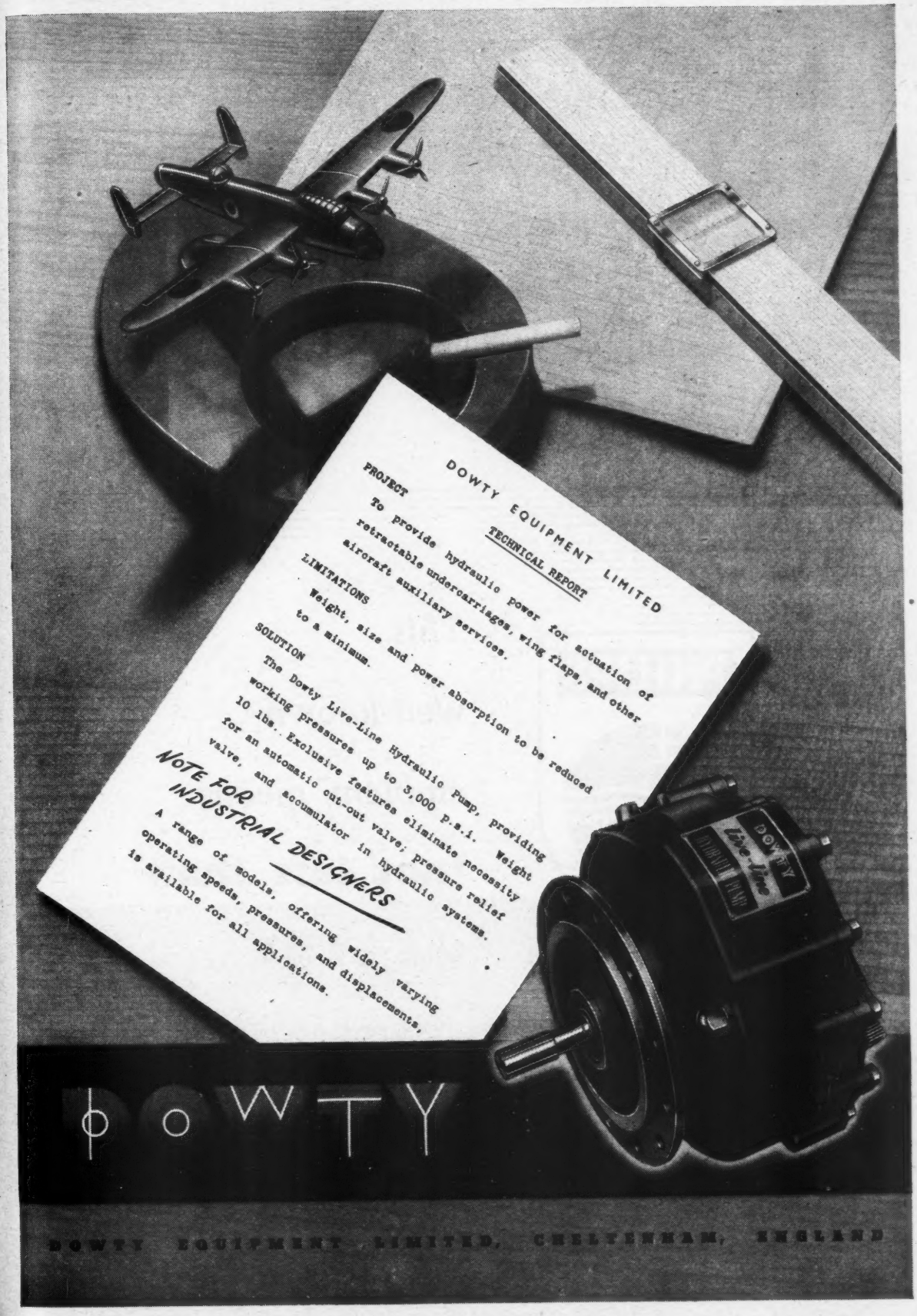
CAMBRIDGE UNIVERSITY AIR SQUADRON

THE University Air Squadrons are now getting back into their former peacetime stride again, and Cambridge intends to reinstate its summer camp during the coming June.

The importance attached to these squadrons by the Air Council is indicated by the recent appointment of Wing Cdr. N. Bicknell, previously Senior Tutor at the Empire Central Flying Training School, to command the Cambridge University Air Squadron. Flying instruction in Tiger Moths has already begun there, and last week Mr. M. T. Moore had the distinction of being the first post-war undergraduate member to go solo.

PRIVATE DELIVERY

THE Douglas Company has now set up its own organisation to take care of the delivery of DC-3s and DC-4s to its customers. Apparently they find this course preferable to that of having customers' pilots and representatives milling around the plant asking when they will get away—but having a whale of a time in Hollywood on the side. Some foreign airlines, by now, should have received their DC-4s—amongst them Australian National Airways and Sabena.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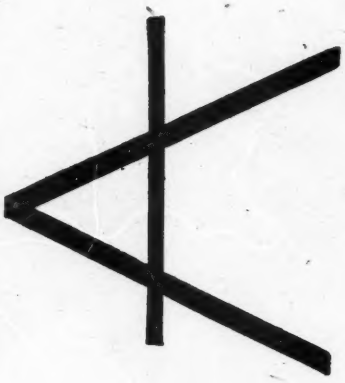

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CIVIL AVIATION NEWS

LOCAL COLOUR : Snake charmers pursue their ancient craft with a modern magic carpet—a Dakota of Tata Air Lines—as a background.

MORE U.S. ORDERS

IT appears as though the Boeing Stratocruiser (Model 377) will be a good seller. Following their usual custom of placing a token order (with possibly a small deposit!), Pan American Airways are said to have ordered twenty deliveries to start in November, 1946.

If P.A.A. take delivery of all the types for which they are alleged to have given orders, they will have not only a very diverse stable, but, also, a great many large aeroplanes. But it is probably a sound policy to make sure of deliveries should a type prove successful, even if it means the loss of a deposit on others.

The Martin Company at Baltimore, too, continue to receive orders for their Model 202 at $200,000 each. The latest customers are Eastern Airlines (50 machines), P.C.A. (35), and Colonial Airlines (20).

ATLANTIC SAFETY

THE agenda for the North Atlantic Air Route Service Conference, to open in Dublin on March 4, covers a wide field, and questionnaires have already been sent to the Governments of the twelve participating countries in order to obtain detailed information on air navigational facilities in the territories under their control and on the proposed future development of these facilities.

Working on the resultant basis, the Conference will consider the existing facilities in the North Atlantic area; the extent to which they can be used for a substantial period in the future; and the degree to which the facilities meet the requirements of services. Provisions for supplementing existing arrangements will also be considered.

The Eire Department of Industry and Commerce, which is making the arrangements, says that the structure of the Conference will probably consist of a general committee and of six sub-committees covering communications, meteorology, airfields and ground aids, search and rescue, air traffic control, and, finally, the co-ordination of the work of the other five committees.

A ROYAL EMPIRE OCCASION

REFERRING to jet propulsion in connection with civil aviation, Lord Winster, in an address to the Royal Empire Society on January 16, said that, at present, the jet engine did not lend itself to economic use in transport aircraft. He did consider, however, that the gas turbine airscrew combination might well oust the piston engine from the aircraft market, and was likely to give economy of operation without recourse to such high-altitude high-speed flying as is necessary with the simple jet.

The Minister for Civil Aviation gave his address on the subject of civil aviation generally, and included a survey of passenger flying from the days of the foundation of the Civil Aviation Department of the Air Ministry in February, 1919, up to the present time. He indicated that the Lancastrian and the York were both "stopgap" machines and would be superseded by the Tudor I and Tudor II for long-distance services. The shorter-distance schedules would be covered by the Vickers Viking and the Bristol Wayfarer. Later, replacements would be made by the Brabazon types, of which the de Havilland Dove was the smallest.

The chair was taken by Mr. Arthur Gouge, M.I.Mech.E., F.R.Ae.S. Other speakers were Sir Frederick Handley Page, who stressed the need for indulging the comfort of air passengers; Sir Robert Watson-Watt, who mentioned that he hoped that radar would make some contribution to a warning system

DOWN WEYBRIDGE WAY : Preparing the Vickers Viking for a visit of inspection by Lord Winster, the Minister for Civil Aviation.

CIVIL AVIATION NEWS

against ice-formation areas; and Major-General the Rt. Hon. Sir Frederick Sykes, who admirably wound up the Society's meeting by saying that what everyone really wanted were British aircraft with British operators for British routes.

GENERAL CRITCHLEY RESIGNS

IN view of impending nationalisation and the fact that B.O.A.C. have a full-time chairman as well as a Director-General, the board of the Corporation has acceded to General Critchley's request that he should be released from his duties as Director-General on March 31. Thereafter, the post will become redundant.

General Critchley held the rank of Air Commodore in the R.A.F. when he was appointed to his post with B.O.A.C. in May, 1943. He then resigned his greyhound racing directorships and, in March, 1944, his commission in the R.A.F.

FIDO AGAIN

THERE appears to be a good deal more than is immediately apparent behind the Ministry of Civil Aviation's decision to reconsider the idea of using the Fido fog-dispersal system at Heathrow. We gather that the original figures for the cost of its operation, as given by the Ministry, were quite incorrect and very much higher than they should have been, and that the greater part of the necessary equipment has already been laid down at Heathrow. Presumably it will cost more to rip out the pipe-lines already there than to continue with the installation. Not that the Fido system can, we feel, be seriously considered yet as a regular bad-weather arrival system, but it might be valuable as a final emergency scheme when no other airfields are "open."

FEATHERING IN MINIATURE

ONE of the difficulties in the design of small twin-engined aircraft is that of providing good single-engined performance at full load. While larger and more advanced aircraft have the advantages of retractable undercarriages and feathering airscrews, and suffer only from difficulties of control in "engine-failure-at-take-off" conditions, the small twin, by its very nature, may be in a less advantageous position. Yet, because it is a twin, it is still expected to fill the requirements.

In the new Aerocar series of small twins which are being produced by Portsmouth Aviation, one of the more interesting features is the provision, in two of the versions, of feathering airscrews. These airscrews, which are now under development by Rotols, are not of the constant-speed type, but can be considered as an improvement on the old two-pitch V.P. airscrews and are electrically operated. In addition to take-off and cruising settings, the airscrews can also be set to a feathering position. They are light, simple and relatively inexpensive.

Consequently, the two versions of the Aerocar intended for serious operation—the Major and the Minor, with Cirrus Major III or Gipsy Major 31, and Cirrus Minor II respectively, each have a useful rate of climb with one engine dead. Helped by a retractable undercarriage, these figures, at sea-level, are expected to be 230 ft./min. for the Major, and 85 ft./min. for the Minor.

THE BERMUDA CONFERENCE

TWO separate committees have been formed in the Bermuda Conference, one to deal with rates and traffic considerations and the other to make preliminary decisions on the use of lease-lend airfields. In the matter of Atlantic frequency operators have so far been working on a basis of the limited agreement of 1937, by which two Atlantic flights weekly were permitted to Britain and the U.S.

The Bermuda Conference is intended to obtain preliminary agreements at "official" level. Full agreements on all questions will necessarily need to be made eventually at "ministerial" level, while I.A.T.A. will, of course, be concerned with rate questions.

"STAR LIGHT" HOME

ON January 14th, at 13.15 hours, the British South American Airways Lancastrian, *Star Light*, was landed at Heathrow after a preliminary "proving" flight to Buenos Aires.

A second flight, with another of the *Star* series, was expected to start for South America on January 21st, and present plans suggest that a regular bi-weekly service may be in operation before the end of March and after a total of six "proving" flights have been completed. Although there is likely to be competition on the run, the Lancastrian, even as merely a "stop-gap" type, is likely to offer a flight schedule better than that possible by any other available aircraft. During the first flight an average cruising speed of 240 m.p.h. was maintained.

AN IMPORTANT PRECEDENT

WHEN so many decisions in civil aviation are being made by people with no real practical knowledge of the problems involved, it is encouraging to learn that the Government of Bermuda has appointed British Aviation Services to act as Air Advisors. Wing Cdr. E. M. Ware, D.F.C., who for a time commanded the Bermuda staging post for Transport Command, will be permanently stationed in the island on behalf of B.A.S. It will be remembered that the B.A.S. managing director, Air Cdr. Powell, was, before the war, operations manager for Imperial Airways in Bermuda, and was afterwards, for a time, concerned with Catalina ferrying operations therefrom for 45 Group.

A CLUB FOR LUTON

A TENTATIVE starting date for Luton's re-formed flying club is given as March 2. The new club will be managed by the Hunting group, and initially the fleet will consist of Tiger Moths and Proctors. At a later date Austers may also be used.

The club's policy will be to offer facilities for private flying and instruction at the lowest possible rates. These will be £3 10s. an hour on Tiger Moths and £6 an hour on Proctors, both for dual instruction and solo practice, with a reduction to £3 on Tiger Moths and £5 5s. on Proctors for flying carried out between Mondays and Fridays inclusive. The decision to make the same charge for both dual and solo is bound up with the safety question, the idea being that of removing a tendency for pilots with only limited experiences to neglect, for financial reasons, any necessary later instruction. The rates have been fixed at these comparative low figures in order that flying may be brought within the reach of the greatest number of people.

LONG-RANGE DELIVERY

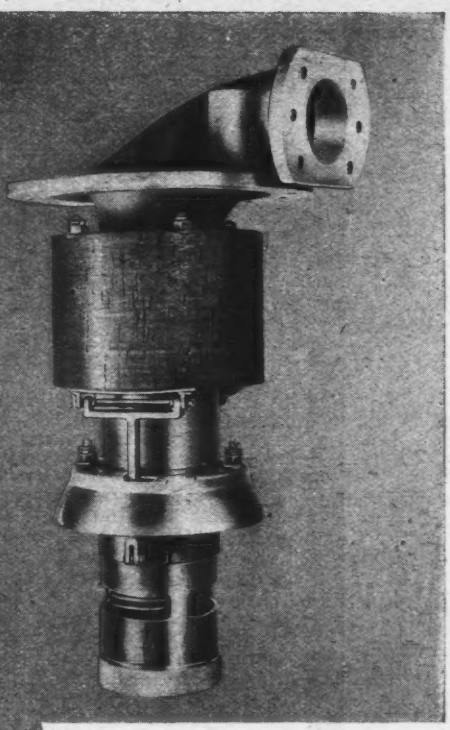
APART from any saving in valuable cost and even more valuable time, the idea of delivering aircraft by air, rather than, ignominiously dismantled, by sea, has always struck us as the obvious way to do it—from the prestige point of view, if from no other. When such deliveries are being made along overland routes air delivery should be universal, and larger multi-engined aircraft might also reasonably be flown to points involving long sea crossings—special quickly removable long-range fuel systems being designed for the purpose and included, perhaps, as hired items in the total cost of the aircraft.

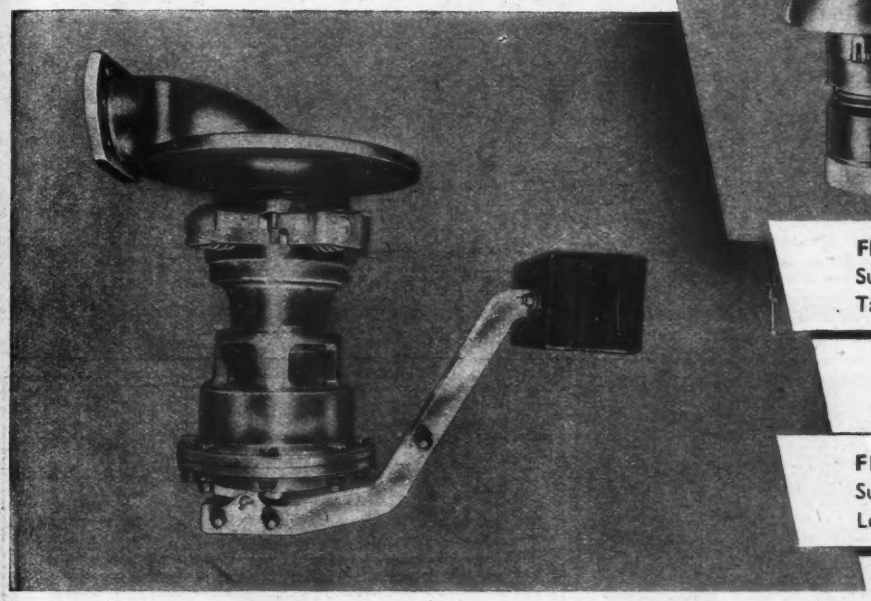
But one cannot feel quite so sure that the idea is good when a single-engined aircraft is being delivered over a 2,000-mile sea crossing. Just once, perhaps, with prestige to be considered—but not as a habit. Nevertheless, and despite doubts, the scheme recently planned by Percival Aircraft is an interesting one, and by the time this appears in print the Proctor V, which is being delivered to Brazil by Mr. J. A. Mollison, should have arrived.

In order to provide the necessary range, the Proctor has been fitted with two overload tanks—one in the cabin and the other in streamlined jettisonable form familiar to wartime fighter pilots. With the standard 60-gallon wing tanks—two 20s and the two 10s which are optional extras—the auxiliary tanks give a total capacity of 160 gallons, which should be ample even for the 1,940-mile crossing, especially as a favourable wind can reasonably be expected for this section of the flight. The drop tank will be jettisoned during this last leg. In the usual way the fuel from this tank is fed by pressure from the reverse side of the vacuum pump to the cabin tank and thence to the main system. At an economical cruising average of 140 m.p.h. and a consumption of 10 gallons an hour, the Proctor should have an ultimate still-air range of 2,240 miles.

All being well, the flight of 4,640 miles will have been made in three stages. Leaving St. Mawgan, in Cornwall, the first landing was being made at Rabat, Morocco, and the second at Bathurst, the two stages being 1,100 and 1,600 miles respectively. If the flight has gone according to plan, Mr. Mollison should leave at daybreak on January 20th and have reached Rabat before dusk. After a few hours he planned to leave for Bathurst, arriving at or about noon, where the aircraft will be serviced for the final stage, which was to be made overnight across the South Atlantic to Pernambuco. The project has none too happily been designated "Exercise Nuts" for purposes of inter-departmental messages.

High Speed Ground Fuelling





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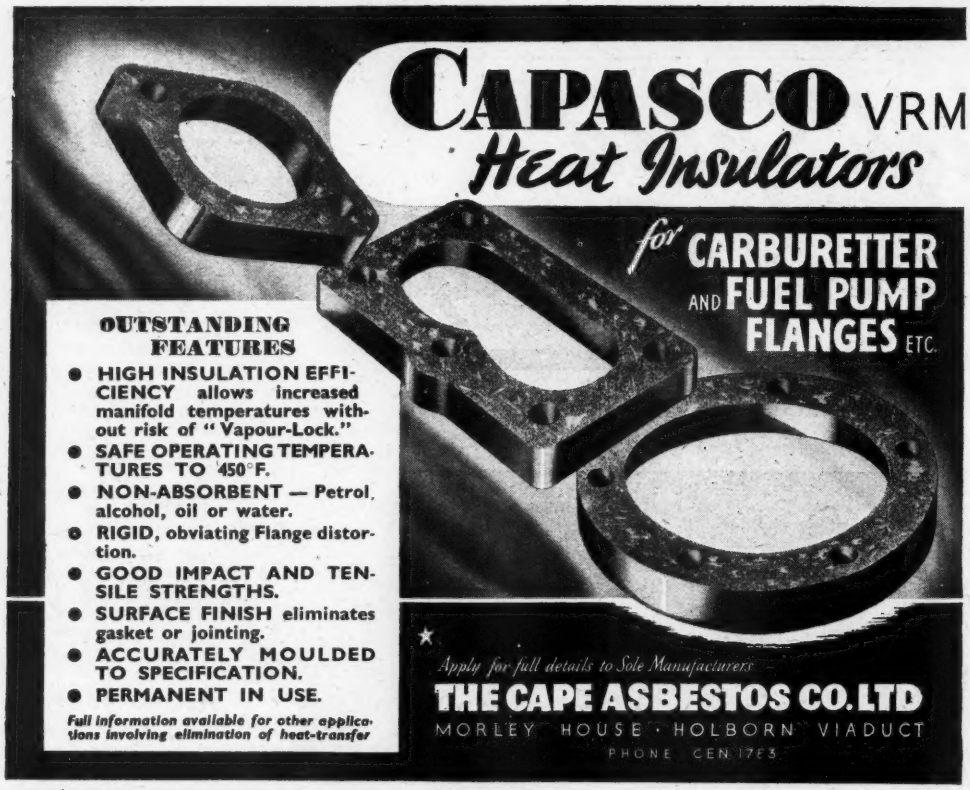

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The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

AIR ACCIDENTS

R.A.F. Transport Command's Record

THERE seems hardly any limit to the human ingenuity which can be exercised by a skilled craftsman in his own field, and it is always a pleasure to watch him at work. May your readers therefore see how your experts reconcile the statement made on p. 28 of *Flight*, January 10th, that R.A.F. Transport Command "achieved the excellent record of only one passenger fatality for every forty million passenger-miles flown throughout 1945," with that made in Parliament by the Air Ministry Under-Secretary on November 14th last, that during the first ten months of 1945 the passenger-miles flown were about 700 million and the passenger deaths over 300?

H. E. WIMPERIS.

[Our correspondent's quotation from *Flight*, January 10th, omits the all-important preceding phrase, ". . . so far as normal scheduled services are concerned . . ." and also ignores the fact that the next paragraph quoted the very much higher fatality rate of the "trooping" figures, namely, one passenger killed for every 3,000,000 miles flown. Even so, these two phrases, the figures for which were supplied by a senior officer of the R.A.F., do not by any means cover the whole of Transport Command's activities.—ED.]

JET HISTORY

Credit Where It is Due

TECHNICAL history of first importance is being made in the jet propulsion field at the present time, and it therefore seems to be owed to posterity that a sense of proportion be retained by those who are supplying the valuable "gen." Despite the paper shortage, *Flight* has admittedly fulfilled its responsibility in passing on the information, but, looking back over the last dozen or so issues, the impression is created that the ardour of the commercial interests tends to submerge the continuing contribution of the vital pioneers. Proudly and rightly, one organisation claims this, and another that, but too often the primary instigators are overlooked.

But for one man's incredible persistence and the faith of his backers, it is probable that both Britain and the U.S.A. would have now been driven to the resort of feverishly imitating the Germans in an effort to catch up. Instead, we are, in the main, well and truly in the forefront. Everything that has followed arose from those early efforts and the initial team, now strengthened, can probably still claim to be inspiring the laudable commercial developers.

The present writer is not one of the "back-room boys" and can therefore claim to be a true spectator. "T. H. B."

[If our correspondent will read our articles again he will find that in almost every one mention is made of the pioneer work done by Air Commodore Whittle and Power Jets. In our summary of Dr. Roxbee Cox's Wright Brothers lecture the history and present set-up of jet and turbine research and development were outlined, the place of Power Jets in the general scheme being clearly explained.—ED.]

NATIONALISED AIRWAYS

Private Enterprise "Outlawed"

TO answer Mr. Haynes' letter (*Flight*, Jan. 10th) I must refer him back to his original letter.

Again, I must remind him that the attitude of Mr. Feverheerd and myself is defensive, and not at all destructive. I must also remind him that the Government took the initiative in this respect by outlawing private enterprise and taking over the fruit of its labours. His insistence that "we are the State" is in danger of becoming archaic, now that the State can act as it pleases, not only against the will of the majority concerned, but also to the detriment of the country.

Maybe he does not specifically *defend* nationalisation. Maybe he *does* only "profoundly hope." So does Mr. Feverheerd, and so do I. But, in his first letter, he showed a dangerous disregard of the fundamental principles of economics, and a tendency to gloss over the serious shortcomings of the Government's scheme.

While answering my previous letter of December 13th, I notice that he admits outright defeat at my first question, avoids the second with remarkable tact (doubtless not wishing to give the "Ordinary Civil Servant" a backhanded compliment such as appeared in his first letter!) and covers the remaining four with rather irrelevant generalisations.

Incidentally, will he explain why he told us in his first letter that Nationalised Air Traffic would provide extra work for *goods* train services?

I am sorry to see that he still regards nationalisation as inevitable, but if it is so, of course I agree that the Government, if it can muster sufficient foresight, would benefit by its own kindness in allowing the experienced operators to run its airlines. Thus an organisation, built with the money of private enterprise, and run by brains developed in the exercise of private enterprise, would redound to the credit of the Government as an example of the superior capabilities of the State. Grand!

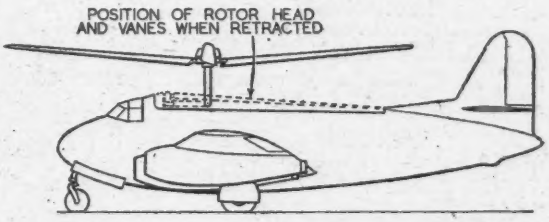
B. E. J. GARMESON.

IN PURSUIT OF SAFETY

Retractable Rotor for Airliners

I SEND this drawing to illustrate an idea of mine based on a faith, which for years I have had, in the ultimate safety of aircraft. I firmly believe that ahead lies a future which, if it is used properly, will make flying one of our safest and most reliable transport systems.

I have just come out of the Army after six years' service, and during that time I was fortunate enough to get a number of flights in R.A.F. machines, but my view is that unless the safety factor can be raised to a higher level, passenger transport by air will never reach the desired popularity. If common sense is used, however, flying can be a useful and profitable venture which will be the means of stopping war for ever by enabling the ordinary peoples of the world to draw closer together and understand each other better.



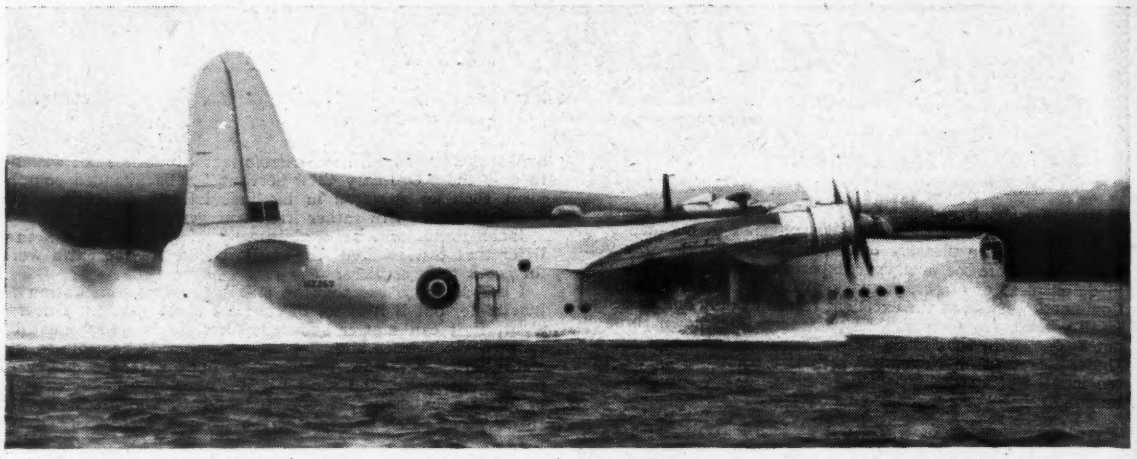
I am convinced that rotating wings provide the answer to the problem of increasing the safety of commercial passenger-carrying aircraft, and I firmly believe that the person who would be most grateful for the solution is the airliner pilot. The appalling accidents which have happened show, as you recently remarked in a *Flight* editorial, that man has not yet completely conquered the air. No, man has been too busy with higher speeds and bigger loads to pay much attention to the safety factor.

Whether we like it or not, the fact must be faced that there is definitely a limit to load-carrying by air. In a normal forced-landing every aircraft has to glide forward at a fast speed so as to land safely, but picture the forced-landing at night with, perhaps, fog shutting off the ground, and it is easy to imagine the terrific strain placed on the pilot. Check that forward speed with the pilot still in full control, and the chances of a safe landing are at least doubled, and a large dividend will be had in the form of the full confidence of passengers and mounting passenger lists.

Trouble in the air does not wait until the aircraft is near a nice flat landing spot; nine times out of ten it happens at places where no chance is given to the pilot of a conventional aircraft to make a safe landing—with the results which we know too well! I say again that the means of making airliners safe to the highest degree lies in rotating wings.

My sketch merely outlines the broad idea of a retractable rotor for safe vertical descent in an emergency, and it could be operated electrically, or in the event of that failing, by free axis rotation automatically started by the first downward movement of the aircraft.

S. H. GOODRIGHT.



HEAVY GOING: An impressive picture of the new Short Seaford flying-boat taxying. Originally designated the Sunderland IV, the Seaford was intended for use against the Japanese. The civil version will be known as the Solent.

SERVICE AVIATION

Royal Air Force and Naval Air Arm News and Announcements

Retirement

Air Chief Marshal Sir Edgar R. LUDLOW HEWITT, G.B.E., K.C.B., C.M.G., D.S.O., M.C., A.D.C. Nov. 19th, 1945.

Promotions

Air Marshals to be Air Chief Marshals:—
Sir Arthur S. BARRATT, K.C.B., C.M.G., M.C.
Sir Douglas C. S. EVILL, G.B.E. K.C.B., D.S.C., A.F.C.
Sir A. Guy R. GARROD, K.C.B., O.B.E., M.C., D.F.C.
Sir John SLESSOR, K.C.B., D.S.O., M.C.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

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W/O. I. M. DAVIES, R.A.F.V.R., No. 622 Sqn.
W/O. H. J. IRONS, R.A.F.V.R., No. 158 Sqn.
W/O. I. A. JORDAN, R.A.F.V.R., No. 90 Sqn.
W/O. J. McFALLS, R.A.F.V.R., No 186 Sqn.
W/O. J. PATE, R.A.F.V.R., No 214 Sqn
W/O. N. W. SPRATT, R.A.F.V.R., No. 15 Sqn.
W/O. R. J. TANNER, R.A.F.VR., No. 223 Sqn.
Act. Flt. Lt. R. C. L. NIELSEN, R.A.A.F., No. 622 Sqn.
Act. Flt. Lt. R. S. SWAIN, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
Flt. Lt. L. R. JONES, R.A.A.F., No. 160 Sqn.
Flt. Lt. E. M. NELSON, R.A.A.F., No. 101 Sqn.
F/O. R. B. A. PENDER, R.A.A.F., No. 101 Sqn.
P/O. P. G. T. HOOLIHAN, R.A.A.F., No. 92 Sqn. (with effect from April 15th, 1945).
Flt. Lt. C. D. NOBLE, R.C.A.F., No. 214 Sqn.
Act. Flt. Lt. W. A. McCLENEGHAN, R.C.A.F., No. 101 Sqn
Act. Flt. Lt. R. P. PATERSON, R.C.A.F., No. 101 Sqn.
Act. Sqn. Ldr. A. E. BROWNE, R.N.Z.A.F., No. 89 Sqn.
Flt. Lt. E. C. REED, R.A.F.V.R., No. 79 Sqn.
F/O. P. R. HUNTING, R.C.A.F., No. 356 Sqn.
Act. Flt. Lt. S. A. TOCCHINI R.A.A.F., No. 51 Sqn.
F/O. K. W. BENNET, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. M. H. DURHAM, R.A.A.F., No. 115 Sqn.
F/O. K. W. FINLAY, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. V. G. HEATH, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
F/O. G. PASCO, R.A.A.F., No 550 Sqn.
F/O. A. SMITH, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. K. C. STEELE, R.A.A.F., No. 78 Sqn.
F/O. J. M. STEWART, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
F/O. A. S. WHITMARSH, R.A.A.F., No. 460 Sqn.
Flt. Lt. N. H. ARMSTRONG, R.C.A.F., No. 103 Sqn.
Flt. Lt. G. T. COUSINS, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
Flt. Lt. H. W. DALE, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
Flt. Lt. J. C. DEUTSCHER, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
Flt. Lt. I. G. DUNCAN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Lt. E. T. FINCH, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Flt. Lt. E. H. GARDNER, R.C.A.F., No. 427 (R.C.A.F.) Sqn
Flt. Lt. A. M. HERING, R.C.A.F., No. 101 Sqn.
Flt. Lt. W. W. KENNEDY, R.C.A.F., No. 101 Sqn.
Flt. Lt. I. E. McPHERSON, R.C.A.F., No. 12 Sqn.
Flt. Lt. A. H. MURTON, R.C.A.F., No. 103 Sqn.
Flt. Lt. T. E. SCHUBERT, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
Act. Flt. Lt. H. C. GRANGER, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
Act. Flt. Lt. N. E. PATTERSON, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. E. McN. BAIRD, R.C.A.F., No. 12 Sqn
F/O. C. G. BLAIR, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. C. W. DUMKA, R.C.A.F., No. 78 Sqn.
F/O. F. S. FINNER, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. J. B. MANNIK, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. R. L. McGILLIVRAY, R.C.A.F., No. 427 Sqn.
F/O. S. PRICE, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
F/O. M. G. REID, R.C.A.F., No. 10 Sqn.
F/O. S. O. V. TEIT, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. R. T. THOMPSON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
W/O. G. WADE, R.C.A.F., No. 101 Sqn.
W/O.2 W. L. YARD R.C.A.F., No. 432 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. L. J. MADDERS, R.A.F.V.R., No. 5170 Sqn.
Flt. Lt. G. W. BUCKLAND, R.A.F.V.R., No 31 Sqn.
Flt. Lt. L. C. CROSSLEY, R.A.F.V.R., No. 117 Sqn.
F/O. M. E. MUNCASTER, R.A.F.V.R., No. 31 Sqn.
F/O. K. A. YOUNG, R.A.F., No. 117 Sqn
W/O. J. H. BUSHBY, R.A.F.V.R., No. 97 Sqn.
W/O. A. G. W. KING, R.A.F.V.R., No. 31 Sqn.
W/O. J. TOWNS, R.A.F.V.R., No. 218 Sqn.
Flt. Lt. J. D. EDWARDS R.A.A.F., No. 31 Sqn.
Flt. Lt. A. E. ANDERSON R.C.A.F., No. 31 Sqn.
Flt. Lt. R. C. GILLIG, R.C.A.F., No. 31 Sqn.
Act. Sqn. Ldr. R. E. GLENSOR, R.N.Z.A.F., No. 49 Sqn.
F/O. A. MILICH, R.N.Z.A.F., No. 198 Sqn.
Act. Wing Cdr. F. M. SMITH, R.A.F.O.
Flt. Lt. G. BANNER, R.A.F.V.R., No. 8 Sqn.
Flt. Lt. R. A. HOBBS, R.A.F.V.R., No. 8 Sqn.
Flt. Lt. H. G. HOW, R.A.F.V.R., No. 10 Sqn.
Flt. Lt. G. W. JACKSON, R.A.F., No. 8 Sqn.
Flt. Lt. D. E. NICHOLSON, R.A.F.V.R., No. 607 Sqn.
Flt. Lt. S. H. TROTTER, R.A.F.O., No. 160 Sqn.
F/O. D. E. W. GOODRICH, R.A.F.V.R., No. 45 Sqn.
F/O. J. F. HAILSTONES, R.A.F.V.R., No. 101 Sqn.
F/O. K. P. MUNCER, R.A.F.V.R., No. 166 Sqn.
F/O. I. J. TANNER, R.A.F.V.R., No. 160 Sqn.
F/O. R. E. SHANKS, R.A.F.V.R., No. 607 Sqn.
W/O. J. H. M. BIRD, R.A.F.V.R., No. 101 Sqn.
W/O. S. M. D. NESSIM, R.A.F.V.R., No 45 Sqn.
W/O. D. THOMPSON, R.A.F.V.R., No. 35 Sqn.
F/O. J. R. LAYTON, R.N.Z.A.F., No. 75 (N.Z.) Sqn
F/O. M. E. PARKER, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
P/O. W. K. PATERSON, R.N.Z.A.F., No. 214 Sqn.

Distinguished Flying Medal

Flt. Sgt. D. C. DUNKLEY, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. (now W/O.) D. R. HARWOOD, R.A.F.V.R., No. 149 Sqn.
Flt. Sgt. D. R. HUGHES, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. H. E. LEWIS, R.A.F.V.R., No. 149 Sqn
Flt. Sgt. A. D. MACKINTOSH, R.A.F.V.R., No. 214 Sqn.
Flt. Sgt. G. L. MARSH, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. E. A. MASON, R.A.F., No. 101 Sqn.
Flt. Sgt. C. J. PETERS, R.A.F.V.R., No. 214 Sqn.
Flt. Sgt. A. T. W. G. STRATTON, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. (now W/O.) A. E. SUTTON, R.A.F.V.R., No. 149 Sqn.
Flt. Sgt. R. A. WILKINS, R.A.F.V.R., No. 100 Sqn.
Sgt. W. R. EADY, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. A. J. AVERY, R.A.A.F., No. 625 Sqn.
Flt. Sgt. I. T. HANRAHAN, R.A.A.F., No. 162 Sqn.
Flt. Sgt. E. GROULK, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
Flt. Sgt. R. W. MOFFATT, R.C.A.F., No. 427 (R.C.A.F.) Sqn
Flt. Sgt. J. McEWAN, R.A.F.V.R., No. 256 Sqn. (with effect from October 11th, 1944) (since deceased).
Flt. Sgt. C. SHAW, R.A.F.V.R., No. 635 Sqn. (with effect from December 23rd, 1944) (since deceased).
Flt. Sgt. C. G. VICARY, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. E. WILLIAMS, R.A.F.V.R., No. 160 Sqn.
Cpl. (now W/O.) A. C. HENEY, R.A.F., No. 50 Sqn
Flt. Sgt. C. A. SHEPPARD, R.A.F.V.R., No. 31 Sqn.
Flt. Sgt. J. R. SUTCLIFFE, R.A.F.V.R., No. 31 Sqn.
Sgt. (now W/O.) D. D. CAIN, R.A.F., No. 61 Sqn.
Sgt. (now Flt. Sgt.) J. N. PRENDERGAST, R.A.F., No. 61 Sqn.
Sgt. (now W/O.) G. A. WRIGHT, R.A.F., No. 61 Sqn.

The Badge of the Royal Indian Air Force. The motto is the same as the R.A.F's.

Roll of Honour

Casualty Communiqué No. 561.

THE Air Ministry regrets to announce the following casualties on various dates. The next-of-kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 201 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. A. Exley; Flt. Lt. R. E. Jones.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. L. Clements; Flt. Sgt. A. Liudzius.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. K. Adams; Sgt. B. R. Armitage; Sgt. C. M. Ashford; Sgt. C. Astall; Sgt. R. C. Baker; F/O K. S. H Barker, D.F.M.; Sgt. R. J. M. Batty; W/O. J. A. Beer; Flt. Sgt. E. W. Bellhouse; Sgt. J. Black; Flt. Sgt. J. H. Blane; Sgt. B. Bloom; Sgt. W. J. Bott; F/O. A. A. A. Bradley; Sgt. W. Broughton; Flt. Sgt. H. McB. Brown; Sgt. N. W. Brown; Flt. Sgt. P. J. J. Byrne; Sgt. J. C. Cameron; F/O. A. S. Cole; Sgt. W. B. Collins; Wing Cdr. P. E. G. G. Connolly; Sgt D. Corris; Sgt. R. B. Cox; Sgt. H. E. L. Craze; Sgt. A. E. Curtis; Sgt. D. W. Dagger; Flt. Sgt. A. W. C. Darby; Sgt. R. J. Davies; Flt. Sgt. C. Davison; Sgt. J. W. Duncan; Act. F/O. T. J. Edwards; Flt. Sgt. W. E. Edwards; Sgt. T. W. Elliott; Sgt. E. J. Flaherty; Flt. Sgt. R. F. Fountain; Sgt. L. A. W. Francis; F/O. G. E. Franklin; F/O. W. F. Freeman, Flt. Sgt. V. Gallagher; Act Flt. Lt. G. R. Garlick; Sgt. A. H. Garnham; Sgt. S. T. G. Gill; Sgt. R. G. Gorick; Flt. Sgt W. E. Griffiths; Sgt. B. J. N. Hackett; Sgt. S. Harding; P/O. I. W. Harland; Flt. Lt. H. R. Harrison, D.F.C.; Sgt. F. Hellier; Flt. Sgt. R. S. Horsford; Sgt. J. N. Howie; Sgt. E. J. Humber; Sgt. M. C. Hunt; Flt. Sgt. R. H. Hutt; Sgt. H. Ison; Sgt. W. J. Jarman; Flt. Sgt.. C. R. Jerwood; Flt. Sgt. P. G. Jones; Act. F/O. C. Lacy; Flt. Sgt. W. Lane; Sgt. B. Leighton; Sgt. B. Leighton; Sgt. F. J. Line; F/O. B. S. Little; F/O. W. G. Llewellyn; Sgt. M. Lomli; F/O. R. Logan; Flt. Sgt. R. McElroy; Sgt. J. R MacNamara; Sgt. A. F. Marshall; Sgt. E. J. Marshall; P/O. S. Martin; Sgt. K. F. Merrifield; Sgt. A. W. Middleton; Sgt. F. W. Mills; Sgt. D. D. Moffatt; Sgt. W. N. Morgan; Sgt. T. Mullen; Sgt. B. L. Munday; Sgt. J. D. Naunton; Sgt. R. P. Naylor; Flt. Sgt. H. R. Neal; Flt. Sgt. K. Nelson; Sgt. A. J. Newell; F/O. N. Nunns; Sgt. J. M. C. Oakley; Sgt. M. Ord; Sgt. J. R. Penton; Sgt. G. Perry; Act. Flt. Lt. J. A. Platten; Sgt. F. A. Powell; Flt. Lt. W. L. Powell; P/O. L. W. Powis; Sgt. E. W. Quick; Sgt. J. Rae; Sgt. P. H Richardson; F/O. H. Sellers; Sgt. F. S. Seymour; Sgt. K. R. Shepstone; Sgt. I. Shingles; Sgt. R. G. Sloman; Flt. Sgt. F. R. Spencer; Sgt. J. C. L. Stacey; Sgt. J. Stanley; Sgt. R. S. Stapley; Flt. Sgt. D. C Stephens; Sgt. C. Sunderland; Sgt. K. H. Tabor; Sgt. C. Terriere; Sgt. C. E. W. E. W. Thomas; Act. Flt. Lt. R. A. Walker; Sgt. S. H. Ward; Sgt. C. J. Watson; Sgt. J. T. Welsh; Sgt. J. H. Whitham; Sgt. K. H. Williams; Sgt. D. Withers.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. M. T. Ades; Flt. Sgt. F. Blunden.

MISSING.—Flt. Sgt. G. H. Day; Sgt. H. T. Furley; Sgt. W. Ness; P/O. E. T. Owen; Flt. Sgt. R. E. Pugh; Sgt. K. Smith; Flt Sgt. H. P. T. Stratford; Flt. Sgt. D. F. J. Thorne.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Act. Flt. Lt. R. C. M. Otter.

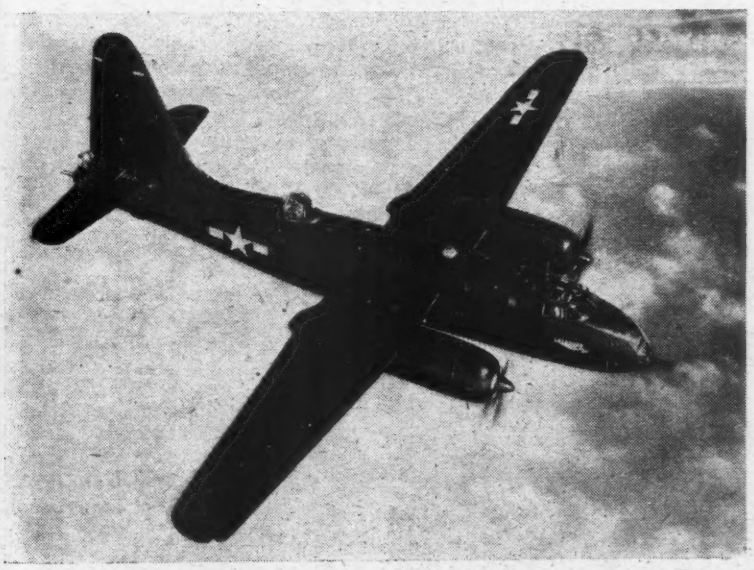
KILLED ON ACTIVE SERVICE.—Flt. Lt. K. J. Banks; Sgt. T. B. Bishop; Flt Sgt. L. J. Boase; F/O. R. S. Bruce; Sgt. R. R. Bryson; F/O. D. P. R. Cameron; W/O. E. C. Cole; Sgt. F. A. Cooper; Sgt. J. Duncan; Sgt. E. J. Ellis; Sgt. J. S. Freeman; Flt. Sgt. J. E. Gardner; F/O. A. J. Gray; Sgt. A. J. Griffiths; W/O. R. W. Hall; P/O. J. B. Handy; P/O. L. D. Holloway; Flt. Sgt. F. J. Jackson; F/O. J. Jamison; Flt. Sgt. F. R. Jeyes; F/O. G. Kay; Flt. Sgt. R. J. Kirby; Sgt. G. Kitching; F/O. D. McNee; Sgt. J. Mann; Sgt. C. G. W. Mawby; F/O. G. C. Mayhew; Act. Sqn. Ldr. A. O. Moffet, A.F.C.; Sgt. W. W. Quinn; Sgt. H. H. Rawnaley; Sqn. Ldr. L. St. J. Rayner; Flt. Sgt. J. T. Rees; F/O. R. A. Rickard; W/O. D. J. Sims; L.A/C. J. Skinner; Sgt. D. W. Stantiall; Flt. Sgt. A. F. Stevenson; Sgt. J. S. Taylor; L.A/C. H. Tildsley; F/O. J. L. Till; Flt. Sgt. M. A. Whiting.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. F. E. Bave; W/O. A. G. Boyce; Sgt. C. Carman; Flt. Sgt. M. D. Fletcher; Flt. Lt. G. G. Gates; Sgt. S. J. Greedy; Flt. Sgt. C. L. Jones; L.A/C. T. D. Laurie; Flt. Sgt. B. T. McCabe; W/O. O. C. B. Williams; W/O. R. Williams.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. G. D. Nesme.

DIED ON ACTIVE SERVICE.—Sgt. A. Ainley; L.A/C. A. G. Allen; L.A/C. J. Ashworth; L.A/C. F. D. Atkin; A/C.1 N. A. H. Barham; L.A/C. H. Bartram; Sgt. F. C. Bice; L.A/C. F. Blood; L.A/C. H. M. Charles; Cpl. K. H. Chrystal; L.A/C. R. M. Clipstone; L.A/C. D. Connell; Cpl. P. K. Cox; Cpl. C. G. Crumplin; L.A/C. T. C. G. Dallimore; Cpl. W. A'Arcy; A/C.2 W. D. Dasher; Sgt. R. L. S. Davidson; A/C.1 E. S. Dennington; L.A/C. A. Dutton; Sgt. F. Edwards; Cpl. D. Evans; Sgt. J. A. F. Few; Cpl. J. T. Fincham; A/C.2 G. A. Fitzgerald; Flt. Lt. W. Freeman; Sgt. N. K. Gattrall; L.A/C. W. G. Gibson; W/O. J. G. Gorst; A/C.2 H. J. Grant; L.A/C. T. Green; W/O. P. V. Helyer; Act. Wing Cdr. C. G. Higgins; Cpl. N. Hughes; L.A/C. H. Hunt; Flt. Sgt. A. L. Jenner; L.A/C. D. W. L. Jones; Sgt. D. King; Flt. Sgt. J. J. W. Lay; L.A/C. W. S. Learie; L.A/C. J. McDerment; L.A/C. D. J. MacKenzie; Flt. Lt. S. J. J. Masek; A/C.2 E. U. Morgan; L.A/C. W. Mott; L.A/C. G. T. B. Newhouse; A/C.2 M. E. Oliver; A/C.1 W. E. Pike; L.A/C. F. T. Preston; Flt. Sgt. P. A. Richards; A/C.1 K. C. Rollinson; Cpl. W. C. Sawyer; L.A/C. J. Seed; L.A/C. R. Smith; L.A/C. H. Southern; L.A/C. T. R. Stacey; Flt. Lt. P. J. E. Stickland; A/C.2 D. Taylor; L.A/C. E. Tenpenny; L.A/C. A. L. Thomas; Sgt. J. Thompson; L.A/C. J. Thomson; Flt. Sgt. A. T. Warren; Flt. Sgt. S. Welsted; A/C.1 W. D. Woods; W/O. J. D. A. Wright; Sgt. E. J. Young.

LOCKHEED'S LATEST is a versatile patrol bomber—the P2v. It is designed to carry rockets or 8,000 lb. of bombs, and radar equipment.



AMERICAN PATROL: A flying view of the new bomber, showing its well streamlined lines and careful finish. Manned by a crew of seven, the P2v is capable of a range of 4,500 miles, maximum speed is 300 m.p.h.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. J. A. Cooper; L.A/CW. P. M. Jonas; A/CW.1 A. Lawrie; L.A/CW. I. J. M. Wright.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Sqn. Ldr. R. A. Wills, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. D. A. J. Ahearn; P/O. H. W. Bird; Flt. Sgt. D. G. W Brown; Flt. Sgt. B. W. Casey; F/O. G. B. Edwards; Flt. Sgt. F. E. M. Crawford; Flt. Sgt. A. B. Hart; Flt. Sgt. R. D. McA. Howden; Flt. Sgt. G. H. Hunkin; P/O. J. L. Israel; Flt. Sgt. W. B. Lyall; W/O. D. H. McNaught; F/O. S. W. Mackay; Flt. Sgt. A. J. W. Mudford; Flt. Sgt. N. E. Parker; P/O. R. H. Passant; Flt. Sgt. M. H. Payne; Flt. Sgt. A. D. Tagget; P/O. J. E. Todd; P/O. D. A. Woods.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. V. M. Thomas.

KILLED ON ACTIVE SERVICE.—W/O. R. W. Knox.

DIED ON ACTIVE SERVICE.—F/O. B. J. Bohane.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. I. S. Alexander; Flt. Lt. G. Croucher; F/O. J. Downing; P/O. L. N. McEachern; F/O. R. Parsons; P/O. R. E. Patterson; P/O. T. J. Peacore; P/O. F. G. Plecan; P/O. G. A. Rae; P/O. A. J. Rammage; F/O. R. A. Rember; F/O. G. K. Renaud; Flt. Sgt. J. Rheubottom; P/O. J. Ringer; F/O. I. C. Robbie; F/O. G. T. Schwalm; F/O. F. W. Schwartz; F/O. H. M. Sharpe; F/O. R. J. Sheen; F/O. J. F. L. Sherrill; F/O. G. E. Sidebottom; P/O. H. A. Smith; F/O. J. A. Smith; F/O. W. R. Smith; Flt. Sgt. H. E. Squibb; F/O. A. G. Stein; W/O. D. D. C. Stewart; P/O. M. L. Strumin;

SERVICE AVIATION

F/O. S. J. Sullivan; Flt. Lt. W. R. R. Sutton; F/O. E. A. Townsend; Flt. Lt. D. H. Trickett; P/O. H. E. Truscott; Flt. Sgt. A. W. Tuuri; P/O. B. P. Upper; P/O. J. A. Urquhart; F/O. K. R. Urquhart; P/O. W. W. Vance; P/O. G. R. Vincent, D.F.C.; F/O. J. D. Wallace; P/O. C. V. R. Wigley; P/O. W. F. Windsor; F/O. B. H. Wrenshall; F/O. H. C. Wright.

MISSING, BELIEVED KILLED IN ACTION.—P/O. H. W. Elliott.

MISSING.—Flt. Sgt. R. J. Krampp; P/O. J. A. Milne.

KILLED ON ACTIVE SERVICE.—F/O. W. P. Thomas.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. D. G. C. Wilson; F/O. J. H. Wilson.

DIED ON ACTIVE SERVICE.—P/O. F. A. Casson; Sgt. D. S. Moore; F/O. R. C. Webb.

Royal New Zealand Air Force

KILLED ON ACTIVE SERVICE.—F/O. F. F. Hildreth.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. W. Norrie.

South African Air Force

KILLED ON ACTIVE SERVICE.—Lt. B. W. Creighton; Lt. T. E Evans; Lt. E. F. Houseman; Lt. R. H. Hullry; W/O. L. Magid; Lt. V. J. Magid; Lt. P. Smit.

DIED ON ACTIVE SERVICE.—Air Mech. C. B Abbott; Cpl. Malyon.

Casualty Communiqué No. 562

Of the names in this list 250 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. P. R. D. Brenchley; F/O. F. W. Clarke; Flt. Sgt. J. H. Draper; Sgt. J. N. Hoad; Sgt. W. J. Pinckney; Flt. Sgt. B. R. Pool; Flt. Sgt. S. V. Wickland.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. S. D. Booth; Flt. Sgt. A. H. Brameld; Sgt. G. E. Carrington; Sgt. F. R. Cragg; Flt. Sgt. J. E. J. Farrow; Flt. Sgt. J. F. Grimshaw; Sgt. J. H. McKee; Flt. Lt. D. H. McLeod; Sgt. P. McNerney; Sgt. W. M. Mann; Sgt. D. K. Moss-Vernon; Flt. Sgt. H. Pickup; Sgt. W. J. D. Pugh; Sgt. G. W. Richards; Sgt. R Robertson; Flt. Sgt. R. E. S. Sanger; Flt. Sgt. M. Schonberg; Flt. Sgt. S. R. Smith; P/O. J. L. Thompson; Flt. Sgt. G. E. Tudor; Sgt. J. Young.

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MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—F/O. M. Angus; Sgt. A. A. F. Morris; L.A/C. R. Napier.

KILLED ON ACTIVE SERVICE.—Sgt. S. Aldridge; L.A/C. S. J. Boughton; Sgt. A. E. Broadbent; Flt. Sgt. F. J. Cleaver; Flt. Sgt. A. G. Collins; Flt. Sgt. S. Cook; Sgt. J. Cunnington; Sgt. J. R. Dale; W/O. W. C. M. Dale; Sgt. W. P. Drummond; L.A/C. J. T. D. Ferraby; F/O. E. Francis; Sgt. I. Gibbons; F/O. J. W. Gooch; Flt. Sgt. L. A. Goodbody; Sgt. J. L. G. Hammond; Flt. Sgt. S. R. Hawkins; F/O. A. W. D. Hill; Flt. Lt. A. Howard; Sgt. J. R. Howard; Sgt. F. Howe; P/O. A. B. S. Jefford; Flt. Sgt. E. H. Knight; Sgt. D. R. Langlands; P/O. G. E. E Long; Sgt. G. Murray; Sgt. D. J. C. Musk; Sgt. A. J. Perry; A/C.2 J. Phillips; Sgt. J. R. Pickover; Cpl. H. A. Plumley; Sgt. P. Purves; P/O. G. W. Roberts; L.A/C. G. H. Roper; Flt. Sgt. F. W. Saxby; Sgt. W. T. Swatton; Sgt. W. R. Symonds; Sgt. O. T. G. Teague; Sgt. J. A. Trevillion; L.A/C G. G. Webb; P/O. R. B. Wilson.

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DIED ON ACTIVE SERVICE.—A/C.2 I. C. Ashman; Flt. Sgt. J. A. Bradstock; Cpl. J. Chalmers; L.A/C. E. J. Connoley; L.A/C. A. Cook; Sgt. G. W. H. Coombes; Act. Sqn. Ldr. P. E. Davies; L.A/C. D. A. Dimond; L.A/C. W. E. Downey; W/O. N. Flower; Sqn. Ldr. J. B. Greany; L.A/C. R. P. Heasman; L.A/C. E. Hughes; W/O. N. Jackson; W/O. H. M. King; Cpl. K. F. Nunn; Cpl F. Peakman; L.A/C. D. P. F. Rhatigan; Cpl. R. E. Rose; Flt. Lt. H. E. Sussmann; L.A/C. F. O. O. Taylor; W/O. W. P. J. Watson.

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Women's Auxiliary Air Force

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Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. J. Acres; P/O. N. J. Bowman; F/O. A. H. Munroe; P/O. T. L. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. J. Adcock; Flt. Sgt. A. O. Beazley; Flt. Sgt. M. A. E. Bradford; Flt. Sgt. P. Callow; Flt. Sgt. J. J. Chigwidden; Act. Flt. Lt. E. W. Chitty; W/O. G. J. Custance; Flt. Sgt. L. A. Eunson; Flt. Sgt. E. J. Everest; Flt. Sgt. J. L. Jago; Flt. Sgt. B. M. Joyce; Act. F/O. T. J. Kenyon; Flt. Sgt. G. T. Kirby; P/O. P. R. Lord; P/O. M. McHugh; Flt. Sgt. T. A. McManus; P/O. F. F. Molinas, D.F.C.; Flt. Sgt. D. M. L. O'Halloran; Flt. Sgt. N. F. Robinson; W/O. R. W. Russell; Flt. Sgt. R. G. Symonds; Flt. Sgt. R. de B. White.

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MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—W/O. I. L. Baker.

KILLED ON ACTIVE SERVICE.—Act. Wing Cdr. B. Howard, D. F. C.; Flt. Sgt. J. B. Thomas.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—W/O. G. F. Hough; W/O. J. P. Mellon; W/O. I. R. S. Noble; W/O. R. J. Peck; P/O. H. Pordage.

DIED ON ACTIVE SERVICE.—W/O. J. F. M. Bennett; W/O. J. G. Shierlaw.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. T. R. Crawford; F/O. N. H. Dixon; Flt. Lt. K. H. Grist; W/O. A. O. Scherbarth; W/O. T. S. Watson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. E. Searson; P/O. J. P. Shortt; P/O. J. Spevak.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. C. E. Anderson; F/O. K. G. Fenske; P/O. G. H. Kendall.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. W. Anderson; P/O. J. E. Garrigan; Sgt. R. R. Halford; Flt. Sgt. B. J. Johnston; F/O. L. W. Koehl; P/O. R. K. McGrath; F/O. J. MacLeod; Flt. Lt. P. A. McMaster; F/O. J. W. Pierry; F/O. J. L. Reid; Sgt. W. L. Thornton-Whittle.

MISSING.—Sgt. W. E. Algar; W/O. J. W. Duncan; Sgt. F. T. Gidilevich; F/O. A. H. Handley; Sgt. J. R. Morin.

DIED ON ACTIVE SERVICE.—L.A/C. J. A. J. M. Mongrain.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. B. W. Corrigall; F/O. E. P. Parcell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. K. P. C. Andersen; Flt. Sgt. E. J. F. Howard; Flt. Sgt. G. H. Redwood; Flt. Sgt. A. H. Scott; Act. F/O. J. H. Scott; Flt. Lt. J. W. Taylor; W/O. E. W. Toohey; F/O. R. C. Veitch; Act. F/O. K. O. Whitehouse.

South African Air Force

DIED ON ACTIVE SERVICE.—Cpl. A. J. Schoeman.

Official Corrections

Casualty Communiqué No. 559.

Under "PREVIOUSLY REPORTED MISSING BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE," for L.A/C. J. Ambler read P/O. J. Ambler.

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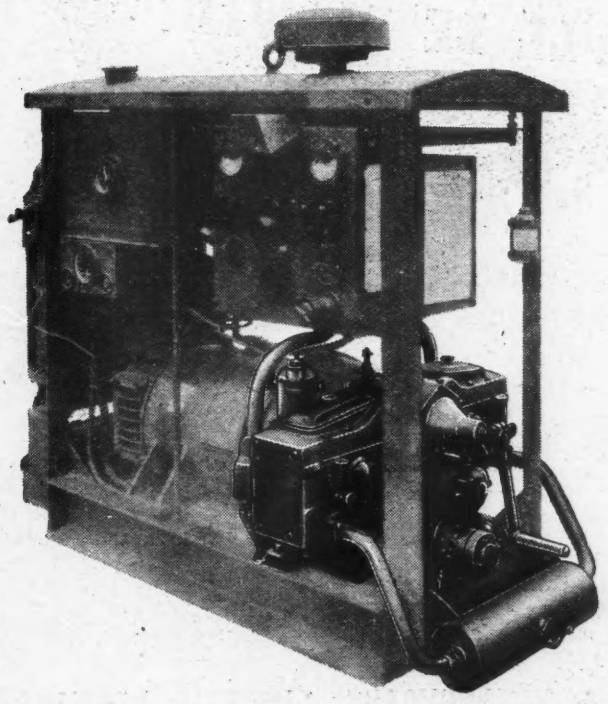

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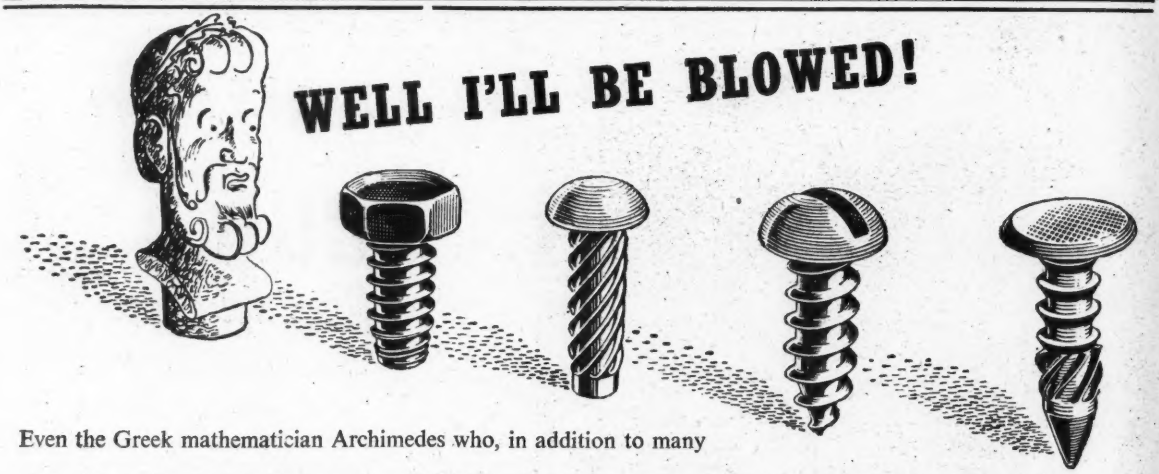

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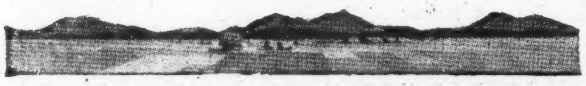

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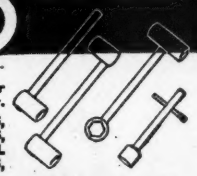

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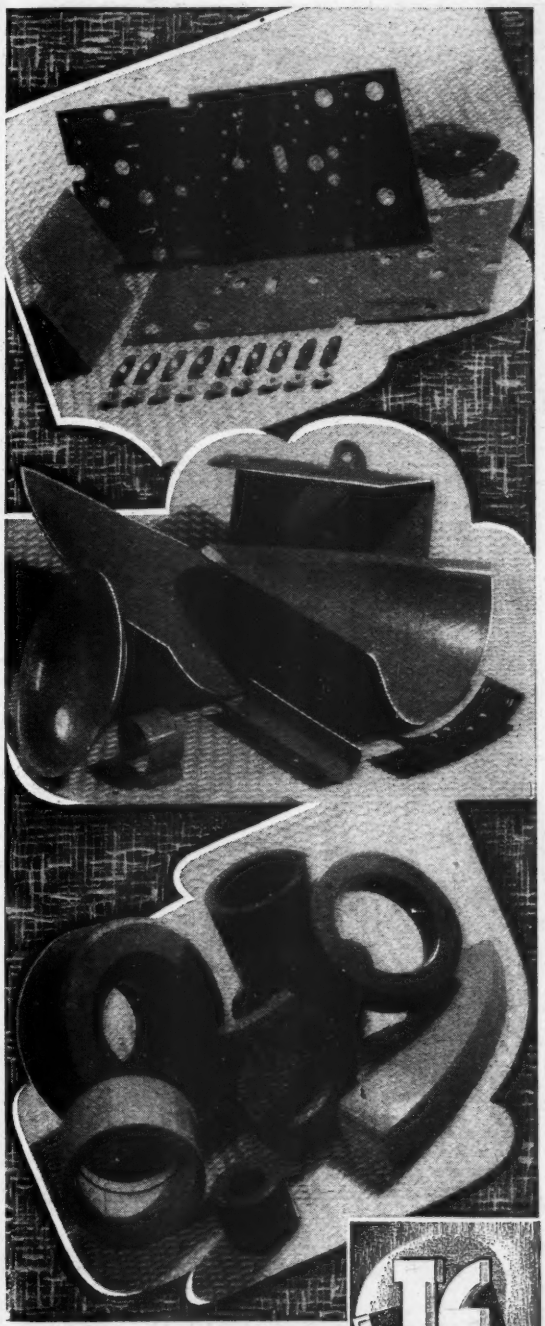

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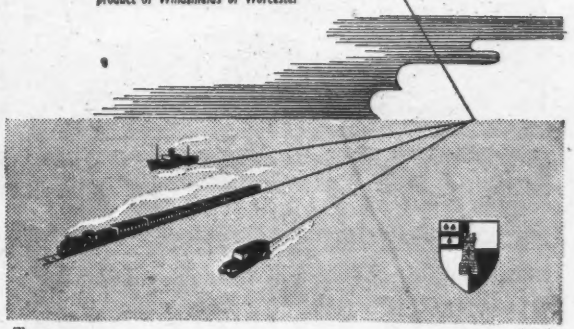

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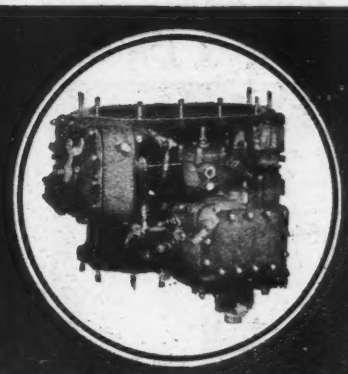

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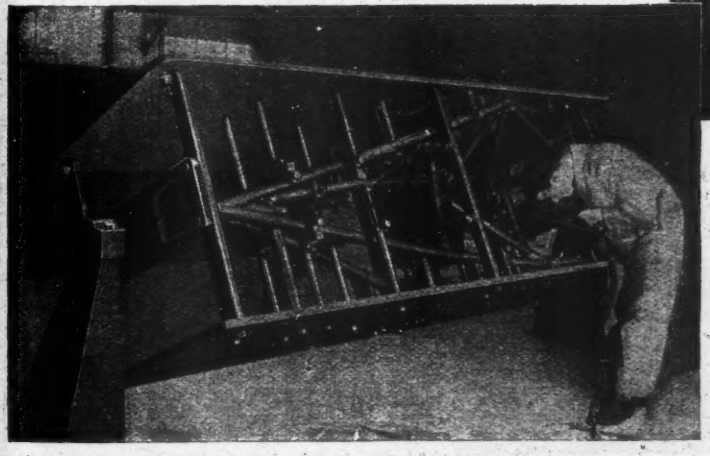

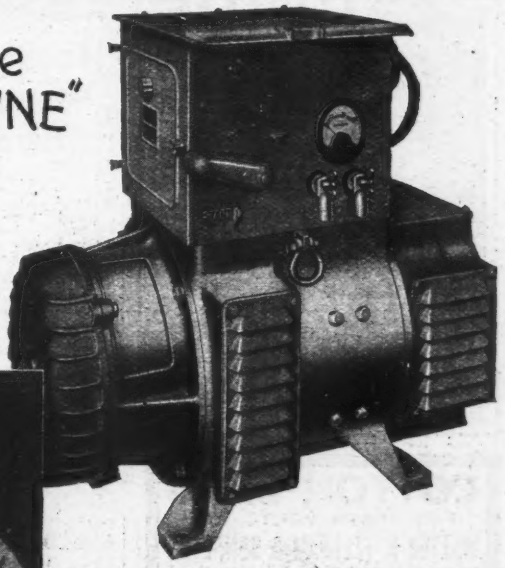

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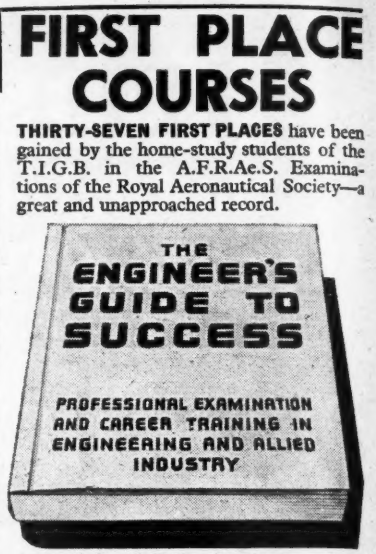

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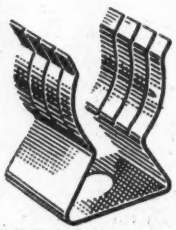

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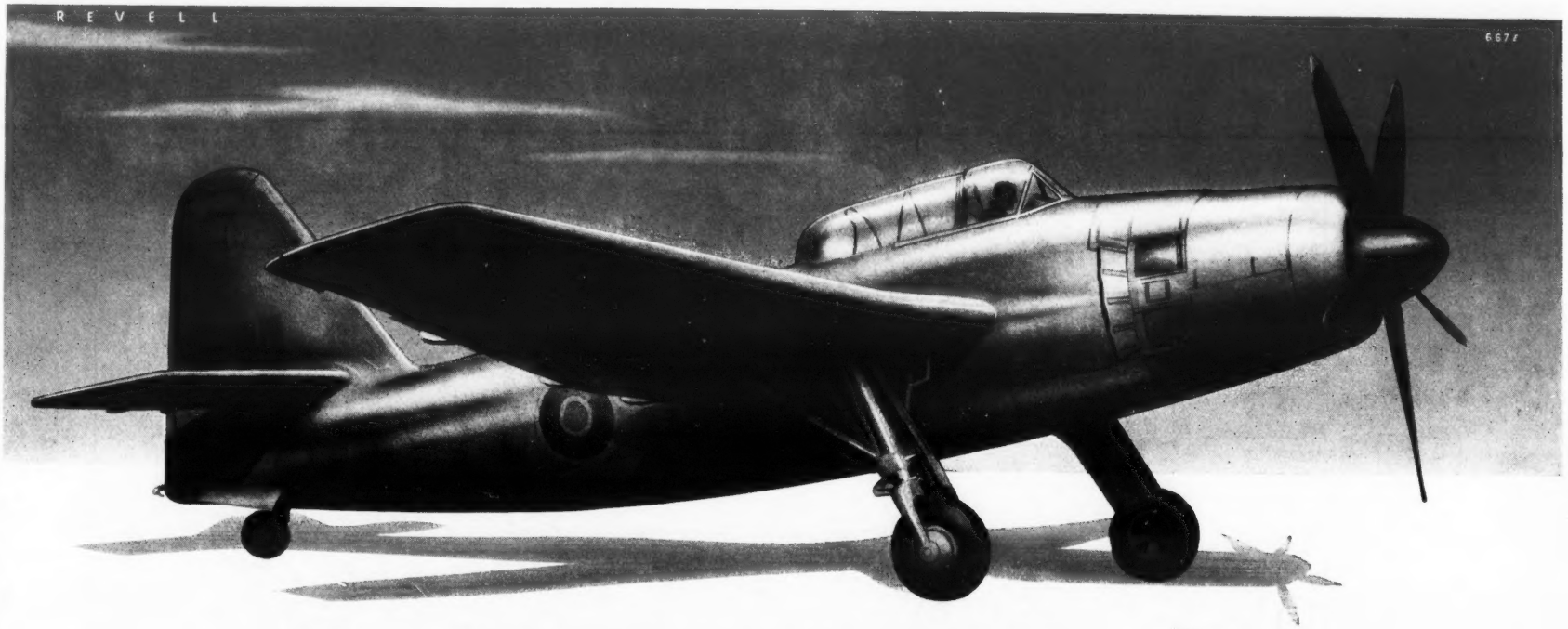

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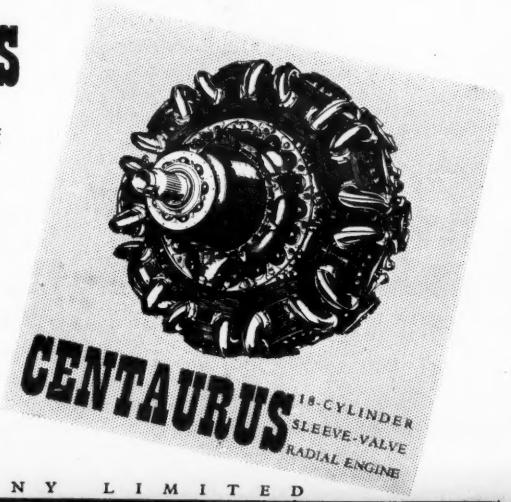

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Printed in England for the Proprietors, Flight Publishing Company Limited, Dorset House, Stamford Street, London, S.E.1, by The Chiswell Press Ltd., 14, Perin Gardens, London, S.E.1. "Flight" can be obtained abroad from the following: Australia and New Zealand: Gordon & Gotch, Ltd. India: A. H. Wheeler & Co. Canada: Imperial News Co., Gordon & Gotch, Ltd. South Africa: Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. United States: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office

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